

GEOMETROID CATERPILLARS OF NORTHEASTERN AND APPALACHIAN FORESTS

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This guide is dedicated to George and Kaye Wagner, who encouraged their child to immerse himself in all things entomological.

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PREFACE

While our primary goal is to provide an identification guide to the geometroid caterpillars of eastern forests, it is also our hope that this volume will promote a greater appreciation for the rich and varied insect biodiversity found in forests of the United States and Canada, and serve as a reminder that proportionately few caterpillars are pests. Most caterpillars, by virtue of their importance in food webs and nutrient cycling, are beneficial. Lastly, we endeavored to show that many forest caterpillars are fascinating and, not uncommonly, visually beautiful subjects.

Caterpillars have long been a favorite among children—each year tens of thousands of these insects are brought into classrooms and nature centers, or are carried home to parents. With this in mind, we designed this publication so that it would be understandable and useful to educators, students, and the general public, while at the same time serving the needs of forest managers, conservation biologists, and professional entomologists.

The literature on North America's geometroid fauna is mostly scattered and generally inaccessible to the nonspecialist. For all but the well-studied species, we wrestled with some uncertainty—about the taxonomy, about what characters would prove diagnostic, and especially about the natural histories of the species included in this manual. Given these uncertainties, this guide must be viewed as a first effort—the taxonomy and our diagnoses will change as these insects become better known. Much remains to be learned about the host ranges and phenologies of all but the most common species. Photographic studies capturing variation, developmental changes, and natural behaviors would make valuable contributions to the knowledge of these important insects. Indeed, much remains to be discovered by those who take the time to observe these and other small creatures that make their homes in forests.



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We could not have completed this work without the help of dozens of collaborators. Foremost of these is Valerie Giles who collected, reared, and photographed caterpillars in David Wagner's laboratory from 1992 to 1997, and who proved to be a constant source of encouragement, insight, and—of course—caterpillars. Dale Schweitzer has generously shared his encyclopedic knowledge of Lepidoptera with us for more than two decades. Chris Maier and Jeff Fengler provided the life history data for several conifer-feeding species. The following individuals supplied distribution data: James Adams (Georgia), Howard Grisham (Alabama), J. Richard Heitzman (Missouri), and Edward Knudson (Texas). Our thanks go to Doug Relyea and Mark Mello for sharing information on seasonal activity.

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Tremendous effort went into the rearing of all these caterpillars—collecting and changing foliage, cleaning containers, preserving vouchers, and labeling and record keeping. The burden for these tasks fell on Valerie Giles, Julia Joseph, Eric Hossler, and Christine Weber—none of this would have been possible without their efforts. To others who pitched in, we are indebted as well: Keith Hartan, Jadranka Rota, Steve Teale, and Monty Volovski. Les Mehrhoff and Charles Sheviak helped out with all things botanical, providing identifications, foliage, and directions to the nearest patch of this or that.

The editorial suggestions of Roberta Burzynski, Julie Henry, Eric Hossler, Julia Joseph, Keith Langdon, and Jane O'Donnell were enormously helpful. David Langor and Brenda Laishley (Canadian Forestry Service), and Donald Lafontaine (Agriculture Canada) lent slides for this guide. Julie Henry also tackled the indexing. Erica Meyer prepared the line drawings. Wendy Harding provided graphic design services, and Lisa Fitzpatrick coordinated the printing of this guide.

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Credits for photographs not taken by the authors are as follows:

Canadian National Collection of Insects (Ottawa): *Epirrita autumnata*, *Eugonobapta nivosaria*, and *Eulithis explanata*

Canadian Forestry Service (Edmonton): *Eupithecia lariciata* (= *luteata*), *Lycia rachelae*, and *Sicya macularia*

Jeffery Fengler, Carol Lemmon, and Chris Maier (Connecticut Agricultural Experiment Station): *Lambdina athasaria*

Valerie Giles (University of Connecticut): *Alsophila pometaria*, *Anagoga occiduaria*, *Besma quercivoraria*, *Cabera variolaria*, *Campaea perlata*, *Cepphis decoloraria*, *Cleora sublunaria*, *Erannis tiliaria*, *Euchlaena irraria*, *Glena cognataria*, *Hethemia pistaciaria*, *Hydriomena ?transfigurata*, *Iridopsis larvaria*, *Itame pustularia*, *Lomographa glomeraria*, *Lomographa vestaliata*, *Macaria aemulataria*, *Macaria minorata*, *Mesothea incertata*, *Metarranthis duaria*, *incertata*, *Nemoria mimosaria*, *Nemoria rubifrontaria*, *Patalene olyzonaria*, *Petrophora subaequaria*, *Plagodis alcoolaria*, *Plagodis fervidaria*, *Plagodis kuetzingi*, *Probole alienaria*, *Probole nepiasaria*, *Prochoerodes lineola*, *Scopula limboundata*, and *Tetracis cachexiata*

Eric Hossler (University of Connecticut): *Ennomos subsignaria*, *Selenia kentaria*, and *Digrammia gnophosaria*

Julia Joseph (University of Connecticut): *Hypagyrtis unipunctata*, *Itame coortaria*, *Macaria bicolorata*, and many of the adult photographs

Jeffrey Miller (Oregon State University): *Dysstroma citrata*

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INTRODUCTION

Butterflies and moths and their caterpillars (Order Lepidoptera) are among the most beautiful, familiar, and loved invertebrates. They are delicate and behaviorally interesting creatures that are welcome in almost any garden. A very small fraction of the world's 150,000 described species of Lepidoptera are serious pests—defoliating forests, ravaging crops, and spoiling harvested stores. Most Lepidoptera are beneficial, providing myriad ecosystem services. Although butterflies are thought to be important pollinators, their contributions are modest relative to the moths that conduct their business under cover of night. Butterflies and moths are integral components in many terrestrial food webs, especially those that include birds, bats, and rodents. The caterpillars of a few species feed on dead leaves, fallen wood, and fungi, and thus accelerate nutrient cycling.

The Geometridae (inchworms, loopers, and spanworms) are the second largest family of North American Lepidoptera with more than 1,400 described species. Although exceptions abound, most species feed on woody perennials, and hence, the family is especially diverse in woodland and forest habitats. Loopers constitute a significant proportion of the insect biomass in forest ecosystems, especially those dominated by conifers. In recent light trap samples from a mid-elevation Appalachian woodland, geometrids accounted for 60% of all the larger moths identified over a three-year period (Butler et al. 1999). Just by their sheer abundance, inchworms, loopers, and spanworms have become integrated into many forest processes. Geometrid caterpillars are a dietary staple for small foliage-gleaning birds, especially warblers, vireos, and related songbirds. Species that pass the winter exposed on bark and twigs are an essential food source for insectivorous birds that are year-round residents in the North. Once the caterpillars mature and move into leaf litter to pupate, their ranks are thinned by a range of insectivorous mammals and ground-foraging birds. Adult geometrid moths fall victim to legions of birds by day and bats by night.

Forest managers are well aware of the family's economic importance. Forty-nine geometrids are discussed in Drooz et al.'s (1989) *Insects of Eastern Forests*. This number is greater than that of any other family of Lepidoptera treated in his compendium of insect pests. In Nothnagle and Schultz's (1987) treatment of North American forest defoliators, the Geometridae accounted for three times as many pest species as any other lepidopteran family. Inchworms known to defoliate large tracts of forest are listed in the box on the next page. None is regarded as a chronic pest; outbreaks are sporadic.

Geometrid forest defoliators in southeastern Canada and the eastern United States (Drooz 1989, Nothnagle and Schultz 1987)

COMMON NAME	SCIENTIFIC NAME	REMARKS
Fall cankerworm	<i>Alsophila pometaria</i>	Periodic outbreaks; serious pest
Linden looper	<i>Erannis tiliaria</i>	Occasional outbreaks in New England
Elm Spanworm	<i>Ennomos subsignaria</i>	Occasional, severe outbreaks
Cherry Scallop Wing	<i>Rheumaptera prunivorata</i>	Occasional pest of black cherry
Hemlock Looper	<i>Lambdina fiscellaria</i>	Occasional defoliator of hemlock
Eastern Pinelooper	<i>Lambdina pellucidaria</i>	Several widespread outbreaks in last century
Bruce Spanworm	<i>Operophtera bruceata</i>	Occasional, but serious defoliator
Winter Moth	<i>Operophtera brumata</i>	Sporadic pest in Nova Scotia
Spring Cankerworm	<i>Paleacrita vernata</i>	Occasional pest of forest and shade trees
Larch Angle	<i>Macaria sexmaculata</i>	Occasional defoliator of larch

Geometrid caterpillars are masters of crypsis. This guide provides a gallery of caterpillars that exemplify how evolution meticulously crafts an organism to match its surroundings. Especially noteworthy are the twig-mimicking species whose behavior and morphology can be so nearly perfect that even the authors have had to squeeze broken twigs on beating sheets to assure themselves that they were not about to cast away their quarry. Beyond simple color matching, the mimicry may even include similarities in texture and reflectance between the caterpillar and its host plant (see Juniper Geometer, *Patalene olyzonaria*).

Caterpillars that feed on conifers are longitudinally striped, and thus incorporate markings that resemble the reflections that play off needles. Other forms of mimicry include resemblance to petioles, stipules, buds, and catkins. Some geometrids seem to have the ability to incorporate floral pigments into their coloration, and in so doing render themselves nearly invisible. The Wavy-lined Emerald (*Synchlora aerata*) is especially noteworthy. This flower-feeding caterpillar uses silk to attach petal fragments onto its back, changing its attire each time it moves to a new flower.

While the literature on the adult stages of the Geometroidea is adequate, documentation on the immature stages is highly fragmented and incomplete. Even though this publication falls short of a comprehensive treatment, we hope that we have assembled enough images and biological information to allow users to reliably identify the common and economically important forest geometroids in the Northeastern and Appalachian Regions.

This guide illustrates 187 of the most common, large, brightly colored, or economically important Geometers (Geometridae) and Scoopwings (Uraniidae: Epiplemidae) present in woodlands and forests of the Northeastern and Appalachian Regions (Figure 1). More than a dozen additional species are diagnosed or in some way differentiated. Our intent is to emphasize generic coverage and forego inclusion of closely similar species that are difficult to distinguish without close examination of setal arrangement (chaetotaxy), head capsule coloration, or crochets. Although the geographic scope is limited to the aforementioned regions, many of the species treated here are widespread, and therefore this guide should be useful for the identification of geometrid caterpillars throughout the East and much of Canada. Our coverage emphasizes forest species, especially those that feed on woody shrubs and trees, and is spotty for many of the forb-feeders (especially Larentiinae). A glossary is provided to assist those unfamiliar with terms used in the guide.

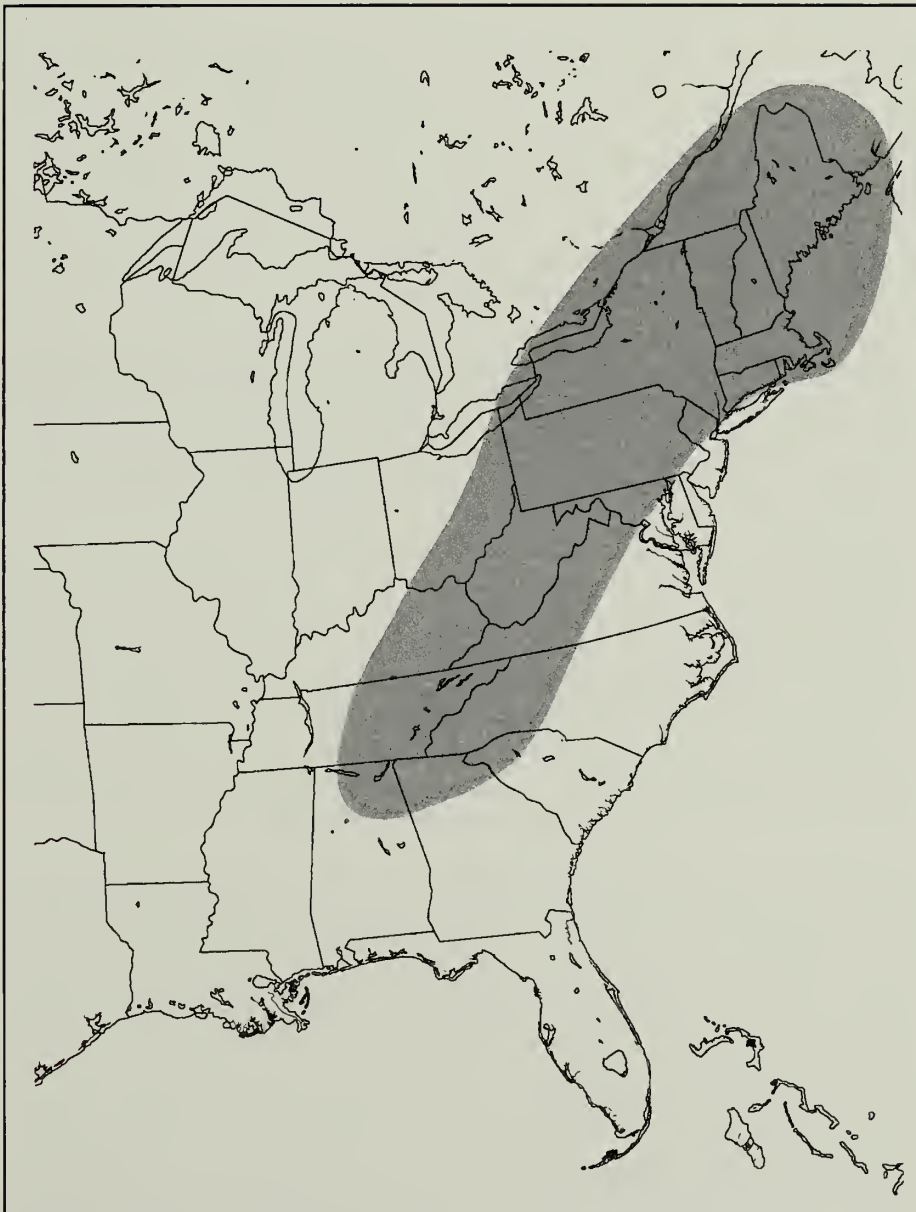


Figure 1. Eastern North America with focal area of this guide shaded.

GEOMETROID LIFE CYCLE

The life cycle follows a sequence involving four life stages: egg, larva (caterpillar), pupa, and adult.

Eggs tend to be elliptical or oblong, and somewhat flattened. Although the majority are cream in color, yellow, orange, and red eggs are also common. The outer surface is most often smooth, but may be sculptured. Typically the eggs are laid singly; however, a few species cluster from two to many eggs. The Maple Spanworm (*Ennomis magnaria*) lays its eggs in elongate rows on bark. Flightless females, such as the Fall (*Alsophila pometaria*) and Spring (*Paleacrita vernata*) Cankerworms, lay large clutches in bark crevices close to where they have mated. Eggs usually hatch 10-14 days after they are laid except in those species that overwinter in this stage.

Larval development includes four to seven instars, with five being the most common. Four occur principally in the Carpets (Larentiinae), while six and seven have been recorded for some ennomines (Ennominae). In many species the first instar caterpillars are dispersive, wandering or ballooning about on silk strands. Larval morphology and coloration may change drastically during the caterpillar's development. Some ennomines that are green and undistinguished in early instars later end up brown and conspicuously variegated. In such instances there are associated changes in larval behavior, e.g., early instar caterpillars may rest on leaves by day, while later instars position themselves on twigs and branches. Prior to each molt the larva ceases feeding and becomes inactive—the next instar's head capsule may be observed within the prothorax of the quiescent, pre-molt larva. After the caterpillar sheds its old integument it may take several hours before it is ready to feed. Larval development is usually completed within 4 to 6 weeks, but may extend over several months, particularly in those species that overwinter as caterpillars.

The last instar caterpillar may construct a cocoon prior to pupation. The cocoon of geometroids tends to be modest, spun in a leaf fold or surface litter. In most species, silk deposition is so limited that the cocoon may be easily opened. Pupation usually occurs in soil or leaf litter, although a few pupate on leaves still attached to the host plant. Many pupate without fashioning a cocoon; the caterpillars simply move or drop to the forest floor and find a safe nook in which to transform. Others make a cell in wood (archiearines) or soil in which to pupate; many of these species remain in their cocoons or cells for months as "prepupae" before molting to the pupal stage. Prior to pupation the larva loses much of its patterning, overall length decreases significantly, while girth may increase. In addition, the gut is evacuated. To the unaware,

these caterpillars appear diseased, especially if a pool of liquid has collected about the prepupa. Hold onto the larva for at least a day longer—a pupa may yet appear.

The pupa is usually some shade of brown, shiny, and bullet-shaped with a strongly tapered abdomen. The end of the abdomen bears a distinct cluster of minute, barbed hooks (the cremaster). In the Waves (Sterrhinae) the pupa is exposed and not enclosed in a cocoon. Like the pupa (chrysalis) of many butterflies, it is angular in shape, patterned, and has a girdle of silk over the top of the body that secures it to the pupation site. The duration of the pupal stage may be as short as 10 to 14 days. In those species that overwinter as pupae, which includes most of our geometrids and both our uraniids, the pupal stage lasts anywhere from 3 to 10 months.

Upon hatching from the pupa, the adult crawls to the surface of the soil or litter before attempting to enlarge its wings. The newly emerged adult pumps blood into its wings until they are fully expanded. The moth may be ready to fly within 30 minutes, but it takes hours before the wings are fully hardened. In many moths, timing of the emergence is closely synchronized, some species hatching at night, while others emerge only during some portion of the day.

Courtship and mating behavior is not well-studied in the Geometroidea, largely because this occurs under cover of darkness in all but a handful of species. Newly hatched females emit a pheromone (scent) that summons males that are downwind. Males of some species have specialized scales on their legs or abdomen that disseminate courtship pheromones that come into play in close-range interactions with the female. Once mated, the female flies about in search of suitable host plants upon which to deposit her eggs. Both sexes use the proboscis (tongue) to imbibe fluids, such as water, nectar, and sap flows. The diet of several Asian geometrids is especially noteworthy as blood, sweat, and tears may all be ingested (Bänzinger and Fletcher 1985).

MORPHOLOGY

Entomology is well-known for its specialized nomenclature, and that for immature stages can be especially arcane. While we have simplified much of the terminology, there are still many structures that have no familiar equivalent. This section illustrates and defines terms that appear in the species accounts. Additionally, a glossary is provided at the end of this volume.

A caterpillar's body is made up of 19 segments: 6 fused cephalic segments comprise the head, 3 thoracic segments (T1-T3), and 10 abdominal segments (A1-A10) (Figure 2). One of the most prominent landmarks on the head is the **frons** or frontal triangle that sits in the middle of the face (Figure 3). Beneath it is the **clypeus**, a narrow plate that runs between the **antennae**. Below the clypeus is another plate, the **labrum** or upper lip. It has a medial cleft or notch that engages the leaf when the caterpillar is feeding. The minute antennae bear little resemblance to those of the adult. On average, stick-mimicking species have longer antennae than those of other geometroid caterpillars. Five of the six lateral eyes (or stemmata) are arranged in an incomplete circle; the sixth is situated below the others, near the base of the antenna. Each lobe of the head may be rounded or, in some cases, shaped into a prominent point or horn.

Each of the three thoracic segments bears a pair of short legs with claws. A **prothoracic shield** runs over the top of the first thoracic segment. This plate, if evident at all, tends to be smaller and less pigmented than that of many other moth families. The first thoracic segment also bears a single pair of **spiracles**—the external openings to the insect's respiratory system. All geometroid caterpillars have nine pairs of spiracles: one pair on the first thoracic segment and the remaining pairs on the first eight abdominal segments. The thoracic and last abdominal spiracles are often larger than the rest.

Stripes refer to markings that run the length of the body, whereas **rings** (thin) and **bands** (wide) encircle the body. An approximate terminology has been adopted to convey where the stripes are located: moving from the top of the body to the venter these are the **middorsal**, **addorsal**, **subdorsal**, **supraspiracular**, **spiracular**, **subspiracular**, **adventral**, and **midventral** stripes (Figure 4). **Line** is used for any linear marking that is confined to a single segment or group of adjacent segments.

The **setae**, or hairlike outgrowths, tend to be inconspicuous in geometroids, although a few species have setae visible to the unaided eyes. Occasionally the **setal bases** (pinacula) are darkened or lightened relative to adjacent coloration. The setal lengths and relative positions (chaetotaxy) are among the most

Figures 2-7: Diagrammatic sketches of an inchworm (*Nepytia canosaria*).

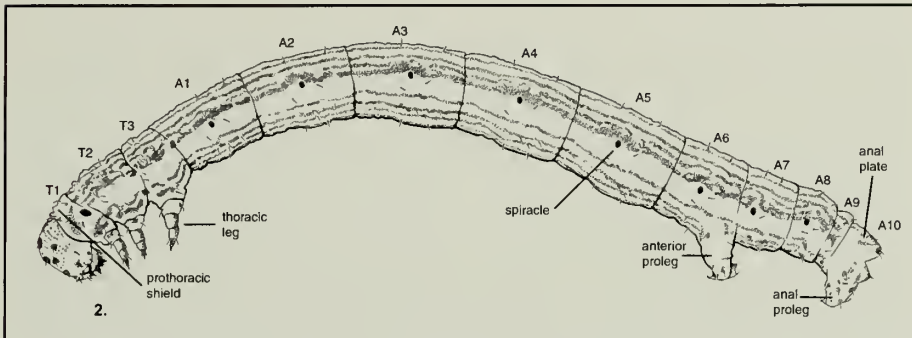


Figure 2. Side view: T1 is the first thoracic segment, T2 the second, A4 the fourth abdominal segment, and so on.

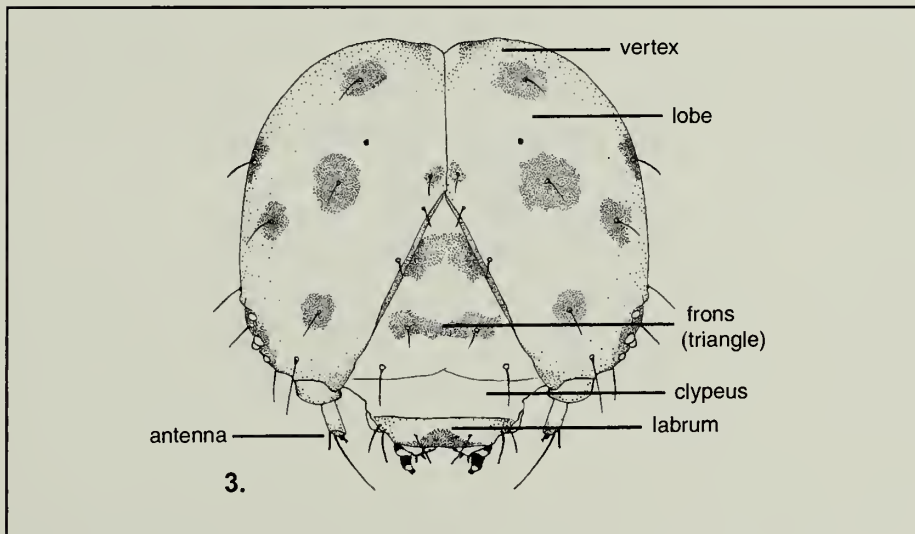


Figure 3. Frontal view of the head capsule.

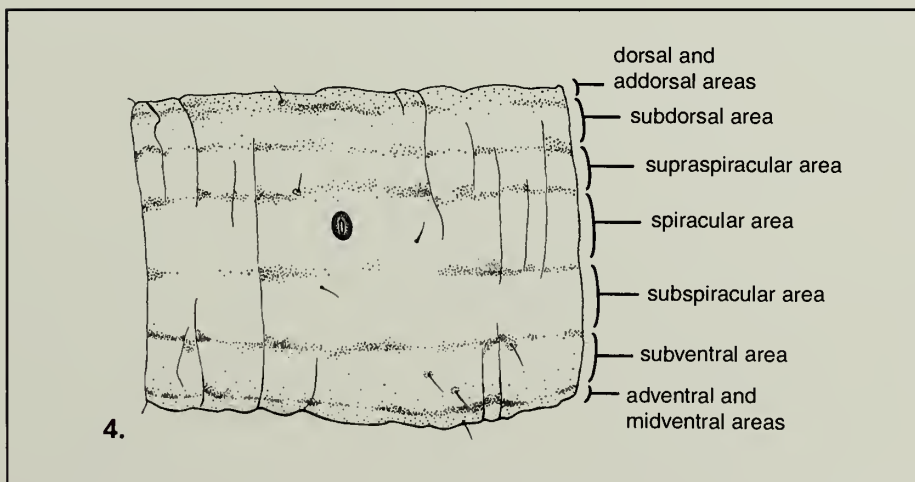


Figure 4. Lateral view of an anterior abdominal segment.

definitive characters used to identify caterpillars in monographic studies, although such features are beyond the scope of this work and are discussed here only sparingly.

The fleshy, hook-bearing legs of the abdomen are called prolegs (Figure 2). Ancestrally, geometroids had four midabdominal pairs on segments A3 to A6 and one terminal pair on A10. Only the scoopwings and one geometrid in this document, The First-born (*Archicaris infans*), have this full complement. A few species have two midabdominal pairs of prolegs on segments A5 and A6. Such additional prolegs (those on A3-A5), tend to be smaller, with a reduced number of crochets or hooks. All the other geometrids in the East possess a single midabdominal pair on A6 (anterior prolegs) and a terminal pair on A10 (anal prolegs). To advance, the larva extends the body forward, grasps the substrate with the thoracic legs, and then draws the prolegs forward, throwing most of the abdomen up into a loop, hence the familiar names for the family: loopers, spanworms, and inchworms. An important diagnostic feature is whether the crochets run continuously (Figure 5) or are separated into two groups (Figure 6). Structures of the last abdominal segment (A10) are often useful for identification. The top of the segment bears a gumdrop-shaped anal plate, which is sometimes pointed or otherwise modified. Pointed fleshy spurs are located to either side of the anus (paraprocts) and below it (hypoproct). These structures are variously developed among geometroids (Figure 7).

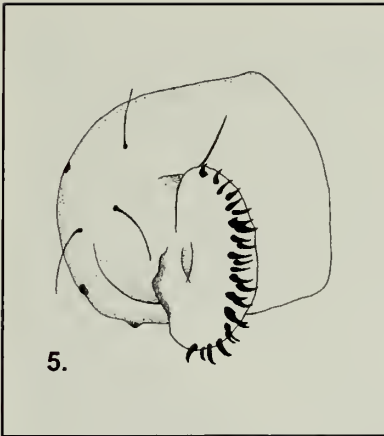


Figure 5. Ventral view of anterior proleg showing crochets in a single group (as in *Macaria*).

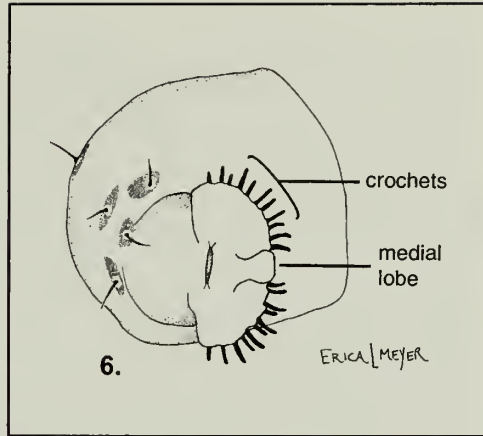


Figure 6. Anterior proleg with crochets in two groups, here separated by a medial lobe (as in *Nepytia*).

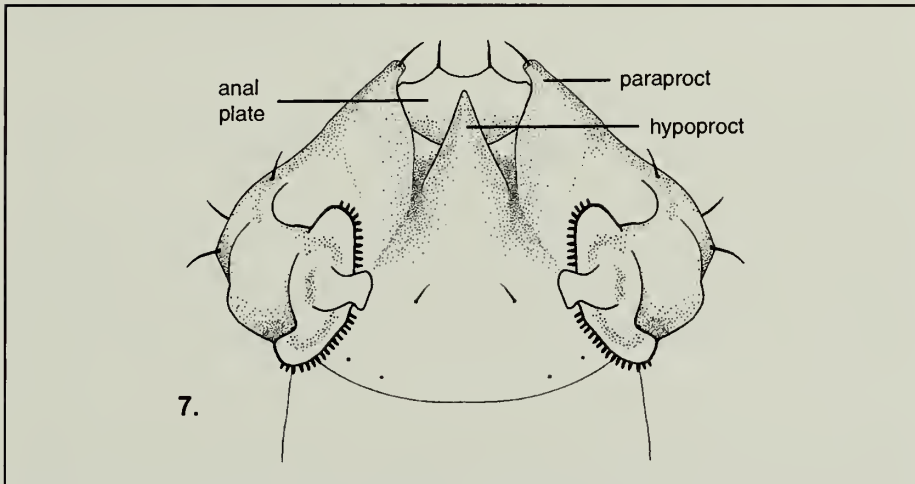


Figure 7. Ventral view of the tenth abdominal segment (A10).

COLLECTING

Although geometroids are among the most common forest caterpillars, they are also some of the most well-camouflaged, and finding them can be a challenge. Freshly damaged leaves are a telltale sign that a caterpillar is in the vicinity. If there is browning or necrosis along the edge where the feeding occurred, you are too late and can move on. Leaves with multiple patches of missing tissue from the middle of the blade have often been damaged by inchworms (this behavior is especially prevalent among laurentiine geometrids)—most caterpillars feed from a leaf edge. Many geometroids are partial to new foliage, so focus your search on leaves growing near the shoot tip and concentrate on leaf undersides. Caterpillars that retreat to the bark by day are not easily found.

The best place to start is your backyard or a nearby woodlot. Collecting may be regulated at parks and nature centers, so check for restrictions. Regardless of location, collecting species that have a limited distribution may require a permit. For more information, contact the local cooperative extension service.

Greatest diversity of caterpillars occurs on trees and shrubs. Nearly all Ennominae (the largest subfamily of inchworms) feed on woody-stemmed plants; geometroid caterpillars found on herbaceous plants are often Sterrhinae or Larentiinae. Birch and oak may have the richest geometroid fauna, with alder, cherry, poplar, and willow not far behind. Inchworms collected on other plants can also be offered foliage from these hosts, if only to simplify rearing efforts. Caterpillars from these and other common trees and shrubs are well-known. To discover species that have not been reared previously, look on low-growing, uncommon, or taxonomically isolated plants. The going will be slow, but your collections will probably be of greater interest. Insect diversity is often highest where sunlight is abundant. For geometroids, roadsides and other edges can be especially good locations. Conversely, forest interiors, especially those with fully closed canopies, may yield little.

The most efficient means of collecting caterpillars is by “beating.” Place a sheet or pale-colored drop cloth on the ground and then use a stout stick to dislodge caterpillars from overhanging branches. Use a rapid, forceful stroke, rapping each branch one to three times before moving on to the next limb. The hand held beating sheets sold by BioQuip (Gardena, CA) are a good investment (Figure 8). Occasionally we use a baseball bat and white bed sheet (Figure 9). In either case, after you have finished examining your sheet or drop cloth for caterpillars, gently tilt it in such a fashion that plant material and other debris slide off. Then reexamine the sheet, often you will find that one or more of the objects still clinging to the sheet will be caterpillars that



Figure 8. Ripstop beating sheet.

have locked their crochets into the fabric. Early instars may be difficult to locate until much of the plant material has been removed from the sheet. In fields and other habitats where the vegetation is low, sweep nets can be used to dislodge caterpillars. Because host plant association can be helpful in identification, it is best if the beating sheet or sweep net is thoroughly examined and cleaned before a new species of plant is sampled. Be sure to note the plant from which each caterpillar is collected and to return unwanted caterpillars back to their appropriate hosts.

Nocturnal collecting efforts, when the caterpillars have moved onto the foliage to feed, can be especially productive. Visual searches and beating by flashlight will yield species rarely taken during the day. A headlamp is almost essential if you plan to do any beating at night because you will need one hand to hold the sheet and the other for the beating stick.

REARING

More than half the species in this guide were reared from eggs secured from gravid females, and of these nearly all were collected from a lighted sheet at night. Most geometroids deposit eggs readily if confined in a container with a sprig of suitable host plant. While some species are almost indiscriminant, laying on any container surface, others require more specific ovipositional substrates. These may be smooth surfaces or, more commonly, roughened surfaces such as paper or bark. Dale Schweitzer (personal communication) includes a twisted length of paper towel into which females can insert their eggs. A few species seem to require specialized cues, for example, the Green Pug (*Chloroclystis rectangulata*) will lay eggs only on the twigs of apple or other host plants. For these, try “sleeving” the females on an appropriate host. This method is described below.

Some females are reluctant initially and may need to be fed for a day or two before they will lay eggs. Offer females a solution of honey or sugar (add approximately 0.5-1.25 ounces of honey or sugar to 1 cup of water) in a saturated cotton ball. Sometimes it will be necessary to uncoil the female’s tongue and place its tip into contact with the solution. We leave a small (4-5 mm) feeding ball in the rearing container, changing it every day or two. Another option is to offer females a moistened raisin that has been cut open, again changing the raisin every 3 to 4 days, before it has a chance to mold. Females held in sleeves can be fed by misting a part of the sleeve and foliage with a sugar-water solution (Tom Allen, personal communication). Although the water in this solution soon evaporates, nighttime moisture may dissolve enough of the sugar for the females to feed; alternatively the sleeve can be lightly moistened with water.

Being generally hardy, able to tolerate overcrowding, and seemingly less susceptible to disease than many other lepidopterans, geometroid caterpillars are easily reared. Cannibalism is so rare as to not be a concern. Keep the foliage fresh, avoid high humidity, and remove frass (caterpillar excrement) before it begins to grow mold, which may require cleaning out the container every day or two when temperatures are warm. Paper toweling at the bottom of the container will serve not only to collect the frass but will absorb excess moisture as well. Many of the forest caterpillar species are polyphagous and thus will accept wholesale substitutions in their diet—it is often convenient to offer common local hosts or plants with foliage that will stay fresh over longer periods. Initially, offer both young and mature foliage, and note which is preferred. Many spring-active species will die if fed older leaves, and conversely, some midsummer species shun new leaves. Some will eat flowers if available.



Figure 10. Forty-dram and one-pint rearing containers.

Closed containers such as vials and plastic bags will keep the foliage fresh over longer periods, but they also retain higher humidities. High humidities promote both mold and disease, so limited ventilation holes, slits, or screening will often improve rearing success. Conversely, prolonged low (indoor) humidities, such as in air-conditioned buildings, can be bad, especially for eggs, newly hatched larvae, and prepupal larvae. A happy medium may be obtained by using ventilated lids and placing the individual containers into a larger plastic holding container (or bag). The little water-picks sold by florists can be used to keep sprigs of foliage fresh for a number of days, even in relatively open containers.

No two entomologists rear their caterpillars in the same way, and no method is regarded as best. Most of the caterpillars in this book were reared individually in 40-dram plastic vials with snap top lids into which a few narrow slits or holes had been punched (Figure 10). The holes were kept narrow so that clipped foliage did not dry out over a 2-day period. Every other day the foliage was changed, frass removed, and excess moisture blotted away. Larger collections of larvae were reared in the plastic pint or quart containers; again holes were punched in lids to provide ventilation.

One of us (D. Ferguson) uses clear, hard plastic (styrene) boxes of various sizes as rearing containers. The bottoms are lined with clean paper toweling almost every day (depending on larval size, density, and container size). The lids are loose. In air-conditioned rooms, the individual boxes are placed inside plastic bags to prevent the rapid desiccation of the food plant. Keep larval densities low as overcrowding will result in smaller adults, unnatural larval color morphs, and may promote the outbreak and spread of disease.

Sleeving is a low maintenance rearing method whereby eggs or larvae are placed in fine-meshed bags (e.g., insect net bags) that are secured over a shoot or limb of the host plant (Figure 11). Added advantages of this technique are that full-sized adults are obtained, and development proceeds as it would



Figure 11. Sleeved caterpillars on a host plant.

in nature. (Laboratory reared moths can have accelerated development and hatch at atypical times of the year.) Before sleeving your livestock (gravid females, eggs, or caterpillars), be sure to thoroughly inspect the branch to ensure that it is free of spiders, predatory stink bugs, assassin bugs, and other natural enemies. On several occasions we have found stink bugs and parasitic wasps attacking our larvae through the netting of the sleeve, thus it may be prudent to double bag important collections.

Many species pupate in litter or below ground so you will want to provide a layer of very lightly dampened sphagnum or peat moss (processed sphagnum is used in gardening or horticulture) in each rearing container. Sphagnum tends to discourage the growth of molds and releases moisture slowly, which can be especially helpful to species that spend many months below ground as a prepupa or pupa. Another alternative is to place pupae in vials over a layer of plaster that has been rewetted.

More than half of the species in this volume have two generations per year from the latitude of Connecticut southward, and hence, caterpillars collected in May and June have a good chance of yielding adults later in the summer. Conversely, those collected in late summer and fall usually will not produce an adult until the following spring. There may be a considerable size differential in those species with two generations: caterpillars from the overwintering brood obtain a greater mass and yield larger adults than those of the summer generation. Differences are so great in the One-spotted Variant (*Hypagyrtis unipunctata*) that the adults of the two generations were described as separate species. An extended period of near-freezing temperatures is usually necessary to ensure emergence of species that overwinter as larvae or pupae. We have had success holding larvae and pupae in a refrigerator for several months; unheated garages, porches, and woodsheds also work well.

The addition of moisture (simulated rain) will help keep livestock from desiccating over the winter months. Rearing containers may dry out very quickly in self-defrosting refrigerators, requiring you to add moisture regularly.

Alternatively, consider placing the rearing containers in plastic bags or other sealed containers. Should you decide to bury your collections or cover them with leaves, take precautions to exclude mice and other insectivorous mammals that are active during the winter, e.g., by enclosing the lots in screening. Many additional suggestions for collecting and rearing caterpillars can be found in Friedrich (1986), Dunn (1993), Covell (1984), and Winter (2000). Friedrich (1986), even with its European focus, is a useful reference, brimming with general rearing information, line drawings, and other useful information.

Geometroids are unusual among Lepidoptera in that larval coloration may be affected by rearing density. Outbreak species such as Spring (*Paleacrita vernata*) and Fall Cankerworms (*Alsophila pometaria*) and the Elm Spanworm (*Ennomos subsignaria*) have melanic (dark) forms that are especially common in outbreak populations. Hence, if it is important to see a range of representative color forms, it may be wise to rear some caterpillars individually. To make matters even more confusing, the amount of tannin in the diet can influence larval coloration, morphology, and behavior in some geometrids (McFarland 1988, Greene 1989). No doubt, much more remains to be learned about these oft-ignored creatures.

Geometroid Parasitoids

Geometrid caterpillars are attacked by several families of insect parasitoids, the most common of which are ichneumonid and braconid wasps that sting the caterpillar and deposit one or more eggs within the looper's body. A few wasp species also attack eggs and pupae. There is great diversity in how the parasitoids conduct their business: they can develop within the host's body or externally. Depending on the species, the female wasp can sting the host caterpillar and kill it immediately, paralyze it temporally or indefinitely, or more commonly, simply lay eggs within the host's body with no immediate effect on the caterpillar. Some flies lay their eggs on leaves near where the caterpillar is feeding; if consumed, the eggs hatch, yielding a maggot that tunnels from the stomach into the body of the caterpillar. Some parasitoids kill their hosts soon after their eggs or larvae gain access to the caterpillar's body. In others, the parasitoid's development is closely tied to that of the host, and the parasitoid may delay its own growth until its caterpillar host is fully mature. Some wait until the host caterpillars have spun their cocoons before completing development, issuing from the vanquished larvae into ready made shelters (the caterpillars' cocoons). Other common insect parasitoids include tachinid flies and chalcidoid wasps. The latter are minute to small insects—even a small geometroid caterpillar may host dozens of these diminutive wasps. The natural enemy complex attacking any one looper can be rich and varied. The Fall Cankerworm (*Alsophila pometaria*) hosts no less than 21 species of wasps in the Braconidae, Ichneumonidae, Chalcidoidea, and 10 species of flies in the family Tachinidae. At least 16 species of flies attack the Elm Spanworm (*Ennomos subsignaria*).

PHOTOGRAPHY

Photography is the best way to record a caterpillar's coloration and appearance. Geometroid caterpillars are good photographic subjects because their slender bodies make it possible to get the entire animal in focus. Most are cooperative subjects that can be readily moved between perches; however, others, once disturbed, seem to wander relentlessly. These we set aside and return to later. Chilling in a refrigerator can be helpful, but the postures that the caterpillars assume may be unnatural. Watch out for the silk that all too often entangles their bodies, especially if the caterpillars have been reared under high densities or their rearing containers are messy. Electronic flashes often illuminate silk that is not otherwise visible.

Most of the photographs in this volume were taken by David Wagner and Valerie Giles in a laboratory setting. A bouquet of relevant foliage was collected as a backdrop. We worked sitting down with our arms resting on a counter top, rocking back and forth through the plane of focus a few times before taking a picture. Although we routinely bracketed our exposures (used a range of apertures), we found that it was even more important to vary the nature of the background. For example, we often placed vegetation behind the caterpillar or photographed the caterpillar against backgrounds that accentuated its coloration.

Because coloration is so variable within species, there remains a great need for additional photographic images of essentially every species in this guide—only when a great many more images of caterpillars have been assembled will entomologists be able to find reliable coloration characters for identification. Photographic studies of earlier instars and pupae are all but lacking for even common inchworms.

Although most of the images shown here are dorsolateral views, we generally attempt to take a dorsal and frontal (head) shot for each caterpillar. The latter can be especially helpful in identification. Similarly, we know ventral coloration to be important, but to acquire such images requires special measures.

PRESERVING SPECIMENS

The easiest way to preserve a caterpillar is to drop it into nearly boiling water until the body is distended, and then transfer the specimen to 70% ethanol. A caterpillar killed simply by immersion in 70% ethanol frequently turns dark, presumably because microbial activity in the gut continues for some period of time. A superior larval specimen is obtained by injecting the body cavity with fixative using a fine needle (#30 for very small caterpillars and #27 for larger specimens). Slowly fill the body with fixative until the caterpillar and its prolegs are fully distended. A simple fixative that yields excellent specimens is made by combining nine parts 70% ethanol with one part acetic acid. Additional larval fixatives based on alcohol, formaldehyde, and glacial acetic acid are discussed in Stehr (1987).

It is often a good idea to change the alcohol once or twice over the first two weeks of preservation because there can be considerable loss of gut contents from the body. Unfortunately, caterpillar colors are especially prone to loss—greens fade within minutes of preservation. If a record of the larval coloration is important, then a photograph or an electronic image should be taken. Preserved collections should be labeled in full with locality, date of collection, and host, and cross-referenced to any photographs, parasitoids, or reared adults. If livestock has been obtained from egg collections, and opportunity allows, it is especially helpful to taxonomists if a few individuals from each larval instar are preserved.

About Classification and Nomenclature

In the Linnaean system all animals are classified in seven categories: kingdom, phylum, class, order, family, genus, and species. Taxonomists often interpolate additional categories, for example, superfamilies and subfamilies are routinely used in the classification of Lepidoptera. The scientific name of all organisms includes two names: the genus and the species name. The genus is capitalized and the species name is given in lower case; in printed materials the scientific name is always placed in italics, underscored, or in some other way distinguished from normal text. When repeating a scientific name, the genus name may be abbreviated by using the first the letter only, e.g., *Alsophila pometaria* may appear as *A. pometaria*. Every organism has a unique scientific name but may have multiple common (vernacular) names. For example, adult and larval stages often have different monikers. Wide ranging species may have many common names, often in multiple languages.

TAXONOMIC OVERVIEW

Geometroids represent one of 49 currently recognized superfamilies of the Lepidoptera (Kristensen 1999). This superfamily includes only two eastern moth families: the Geometridae and Uraniidae (one other, the Sematuridae, occurs in the American Southwest). The eastern North American Geometridae are further subdivided into five subfamilies (see list below); all of our Uraniidae are classified in the subfamily Epipleminae. Common or vernacular names are often made by replacing the suffixes as follows:

Category	Latin name	Common name
Superfamily	-oidea	-oids
Family	-idae	-ids
Subfamily	-inae	-ines

For example, the emeralds (Family Geometridae: Subfamily Geometrinae), are also commonly referred to as the geometrines. One other category is mentioned in this guide, that of tribe, a rank that falls between the subfamily and generic levels. An overview of the higher classification of the moths treated in this guide appears below.

Class Insecta (insects)

Order Lepidoptera (butterflies and moths)

Superfamily Geometroidea (geometroids, uranioids, and sematuroids)

Family Geometridae (geometers, geometrids or loopers, spanworms, inchworms and measuring worms)

Subfamily Archiaerinae (archiaerines)

Subfamily Ennominae (ennomines)

Subfamily Geometrinae (geometrines or emeralds)

Subfamily Sterrhinae (sterrhines or waves)

Subfamily Larentiinae (larentiines or carpeters)

Family Uraniidae (uraniids or sunset moths and kin)

Subfamily Epipleminae (epipleמידs or scoopwings)

USING THIS GUIDE

The order of the species accounts that follow corresponds closely to that of the Check List of the Lepidoptera of America North of Mexico (Ferguson 1983). Exceptions are made to keep a few species that appear similar together. The classification adopted in this guide appears below, with the number of species for which we provide an image in parentheses.

Superfamily Geometroidea

Family Geometridae

Subfamily Archiearinae

Archiearis (1)

Subfamily Ennominae

<i>Alsophila</i> (1)	<i>Epimecis</i> (1)	<i>Tacparia</i> (1)
<i>Protitame</i> (1)	<i>Melanolophia</i> (1)	<i>Homochlodes</i> (1)
<i>Heliomata</i> (1)	<i>Eufidonia</i> (3)	<i>Gueneria</i> (1)
<i>Eumacaria</i> (1)	<i>Biston</i> (1)	<i>Selenia</i> (1)
<i>Itame</i> (6)	<i>Lycia</i> (3)	<i>Metanema</i> (2)
<i>Epelis</i> (1)	<i>Hypagyrtis</i> (2)	<i>Metarranthis</i> (3)
<i>Mellilla</i> (1)	<i>Phigalia</i> (2)	<i>Cepphis</i> (2)
<i>Macaria</i> (12)	<i>Paleacrita</i> (1)	<i>Anagoga</i> (1)
<i>Digrammia</i> (3)	<i>Erannis</i> (1)	<i>Probole</i> (3)
<i>Trigrammia</i> (1)	<i>Lomographa</i> (3)	<i>Plagodis</i> (5)
<i>Enconista</i> (1)	<i>Cabera</i> (2)	<i>Caripeta</i> (3)
<i>Orthofidonia</i> (2)	<i>Apodrepanulatrix</i> (1)	<i>Besma</i> (2)
<i>Hesperumia</i> (1)	<i>Erastria</i> (1)	<i>Lambdina</i> (3)
<i>Ematurga</i> (1)	<i>Thysanopyga</i> (1)	<i>Cingilia</i> (1)
<i>Hypomecis</i> (1)	<i>Lytrosis</i> (2)	<i>Nepytia</i> (2)
<i>Glena</i> (3)	<i>Euchlaena</i> (5)	<i>Sicya</i> (1)
<i>Stenoporpia</i> (1)	<i>Xanthotype</i> (2)	<i>Eugonobapta</i> (1)
<i>Aethalura</i> (1)	<i>Pero</i> (2)	<i>Eutrapela</i> (1)
<i>Iridopsis</i> (6)	<i>Nacophora</i> (1)	<i>Patalene</i> (1)
<i>Anavitrinella</i> (1)	<i>Campaea</i> (1)	<i>Prochoerodes</i> (1)
<i>Cleora</i> (2)	<i>Ennomos</i> (2)	<i>Tetracis</i> (2)
<i>Ectopis</i> (1)	<i>Epirranthis</i> (1)	<i>Antepione</i> (1)
<i>Protoboarmia</i> (1)	<i>Petrophora</i> (1)	<i>Nematocampa</i> (1)

Family Geometridae (*continued*)**Subfamily Geometrinae**

<i>Nemoria</i> (5)	<i>Chlorochlamys</i> (1)	<i>Hethemia</i> (1)
<i>Dichorda</i> (1)	<i>Chloropteryx</i> (1)	<i>Mesothea</i> (1)
<i>Synchlora</i> (1)		

Subfamily Sterrhinae

<i>Idaea</i> (2)	<i>Cyclophora</i> (2)
<i>Pleuroprucha</i> (1)	<i>Scopula</i> (1)

Subfamily Larentiinae

<i>Dysstroma</i> (2)	<i>Spargania</i> (1)	<i>Operophtera</i> (1)
<i>Eulithis</i> (4)	<i>Anticlea</i> (1)	<i>Eupithecia</i> (5)
<i>Thera</i> (1)	<i>Xanthorhoe</i> (1)	<i>Chloroclystis</i> (1)
<i>Hydriomena</i> (3)	<i>Hydrelia</i> (1)	<i>Cladara</i> (2)
<i>Coryphista</i> (1)	<i>Venusia</i> (2)	<i>Lobophora</i> (1)
<i>Rheumaptera</i> (3)	<i>Trichodezia</i> (1)	<i>Heterophleps</i> (2)
<i>Entephria</i> (1)	<i>Epirrita</i> (1)	<i>Dyspteris</i> (1)
<i>Mesoleuca</i> (1)		

Family Uraniidae**Subfamily Epipleminae**

<i>Calledapteryx</i> (1)
<i>Callizzia</i> (1)

A synopsis of common morphological features and life history information precedes each family and subfamily. For many taxonomic groupings, e.g., tribes and larger genera, we discuss general characteristics in the first applicable species account. Moreover, biological observations shared by all members of a genus may be parceled out among the included species, and so the reader is encouraged to cast about.

Common and scientific names are provided for each species in this guide. When a different common name exists for the larval and adult stages of the same insect, we used the name for the larva and include the name for the adult in brackets after the scientific name. For those few instances where a common name was not available, we suggested one that seemed appropriate. One larval and adult image are provided for each species. We attempted to choose an image that is typical for the species, but be cautioned, both larvae and adults of geometroids may be highly variable in coloration. With few exceptions, all of our images are of last instar (mature) caterpillars; also, unless otherwise noted, our descriptions apply only to mature larvae. Many ennomines that are green and unwarted in early instars add warts, swellings, and pigment at each molt. Several larval images and descriptions in this guide are based on larval collections that failed to yield an adult—we use a question mark where uncertainty remains about the identity of a caterpillar. Transparency and specimen vouchers for images are deposited at the University of Connecticut, USDA c/o National Museum of Natural History, or the New York State Museum.

Each species account includes a diagnosis that emphasizes what we hope will prove to be accessible and reliable identification characteristics. Expect variation, especially in coloration and patterning; only rarely will your collections match our images. Rather, pay close attention to overall body shape, the size and positioning of warts or swellings, and other characters as described. We shied away from using chaetotaxy and other features that would require the use of a microscope. Usually we mention, and sometimes differentiate, co-occurring species that might be confused with those that are illustrated.

The distribution and abundance information includes the habitat, range, seasonality, and relative abundance of each species. Range is based on the works of Forbes (1948), McGuffin (1958-1988), and our examinations of material in the American Museum of Natural History (New York), New York State Museum (Albany), United States National Museum (Washington DC), University of Connecticut Insect Museum (Storrs), and the private collections of James Adams (Dalton, Georgia), John Glaser (Baltimore, Maryland), Howard Grisham (Huntsville, Alabama), J. Richard Heitzman (Independence, Missouri), Edward Knudson (Houston, Texas), Chris Maier (New Haven, Connecticut), and Dale Schweitzer (Port Norris, New Jersey). Our treatment emphasizes species' distributions east of the Great Plains and often omits states and provinces farther west.

The biology of most species is too poorly known for exact statements about seasonal activity and rangewide abundance. Our fallback position was to provide approximations of seasonality and abundance for Connecticut and Maryland — areas from which there are many museum specimens and with which we are familiar. The months given for mature caterpillars are based on wild-collected caterpillars as well as inferred periods of activity gleaned from the label data on adult specimens.

Numbers of generations in the North and South differ: species that have two generations per year in southern New England often have but a single generation in northern Maine, yet three or more generations in the South. Frequently we make note of such differences. In any case, our characterizations are first approximations, as this information is not generally available for many of the moths treated in this guide. Therefore, use this information cautiously. In many species the second and subsequent generations are facultative, i.e., only a fraction of the population cycles through the additional generation(s). As an example, many Angles (macariines) have a large second brood in Connecticut, but some pupae from the first summer generation hold over until the following summer. To complicate matters further, Angles often have a small third brood, with caterpillars maturing very late in fall, if at all.

Abundance is subjective and applies principally to Connecticut. Species that we regard as common can be scarce elsewhere; conversely, those that we regard to be uncommon to rare may be quite common in other parts of their ranges. General information on abundance can be found in Covell (1984).

We have not attempted to provide a complete list of known host plants, especially for those species with catholic diets. Principal sources for host records include Forbes (1948), McGuffin (1958-1988), Prentice (1963), Tietz (1972), Covell (1984), Porter (1997), and Handfield (1999). A number of the hosts in the literature, such as those that appear in Prentice (1963), appear to be exceptional or even erroneous. We have ferreted out a number of problems,

but fear others will be passed along, yet again. Dozens of new host records derived from our combined rearing programs appear in this guide. An index to host plants appears at the back of this volume.

Our strategy in the remarks section is to provide a potpourri of each species' natural history and taxonomy. Taxonomic problems are usually treated in this section, and hence users requiring a definitive determination should always read through the remarks. Mention of the overwintering stage often closes each account. (Note: if the overwintering stage is uniform for an entire genus this information may appear in only one of the species accounts.)

After the species accounts we provide partial collection data for all of the adults (Appendix A) and larvae (Appendix B) that are figured, and a glossary. A list of helpful literature is provided for those who want to delve more deeply into biology and taxonomy of these organisms. We did not attempt to compile a comprehensive bibliography—users should consult McGuffin (1958-1988) and McCabe (1991) for more extensive accounts of the literature on eastern Geometroidea. Finally, an index to the caterpillars and moths in this guide is provided.

LOOPERS, SPANWORMS, AND INCHWORMS

(Family Geometridae)

Geometrid caterpillars can be immediately distinguished from all other families of Lepidoptera by their abdominal prolegs. In all but three of the species described in this guide, there are only two sets of prolegs: an anterior pair on A6 and an anal or posterior pair on A10 (Figure 2). In the three species that have more than two sets of prolegs, the additional pairs (on segments A3 to A5, or just A5) are reduced in size. Another feature that sets the family apart from other caterpillars is the disparity in the lengths of the abdominal segments. Anterior segments tend to be long and shallowly annulated while those of the last four abdominal segments tend to be shorter and sandwiched together (Figure 2). Bright colors are rare; most caterpillars are cryptically colored in greens and browns. Both coloration and pattern tend to be highly variable, a point to keep in mind when using the images to identify unknown caterpillars. The setae tend to be small and inconspicuous. The position of the warts and knobs can be extremely helpful, but these too vary in their development, especially among instars.

Archiearines (Subfamily Archiearinae)

Members of this primitive subfamily are distinguished from all other loopers by their full complement of midabdominal prolegs. Crochet-bearing prolegs are found on segments A3 to A6, although the anterior pairs are smaller and not used for walking. Only two species occur in the East, adults of which are day-active in the very early spring. Adults puddle and feed at dung.



The First-born (*Archiearis infans*)

A green caterpillar with a pale subspiracular stripe that runs onto the anal plate, it has thinner addorsal, subdorsal, supraspiracular white stripes. Setal bases on the abdomen above the supraspiracular stripe may be whitened. In both archiearines, the cuticle between adjacent abdominal segments is often yellowed. The yellow-green head is unmarked. The midabdominal prolegs get progressively larger rearward. Mature larva to 3 cm. In *Leucobrephos brephoides* the stripes have a yellow cast and are less conspicuous, and there is a white midventral stripe. *L. brephoides* is more boreal in its distribution.



DISTRIBUTION AND ABUNDANCE Hudsonian and Canadian zone forests. Transcontinental in Canada, in the East south to New Jersey, Pennsylvania, and Wisconsin. Connecticut: one generation with mature caterpillars in June and July, local and uncommon.

COMMON HOSTS Alder, paper and gray birch (but refuses black birch), poplar, and willow.

REMARKS The caterpillar fashions a leaf shelter and rests within it by day. Despite the presence of a complete set of prolegs, the larva still loops in typical geometer fashion as it moves. Prepupal caterpillars spin a dense cocoon, incorporating fragments of bark and other debris. Captive individuals will die if they are not provided with cork, rotten wood, or similar material into which they can fashion nooks for their cocoons. The pupa overwinters. The beautiful day-flying adults emerge very early in the year, often when there is still snow on the ground, hence its common name, The First-born.

Ennomines (Subfamily Ennominae)

The Ennominae make up the largest and most heterogeneous of North America's five geometrid subfamilies (nearly two thirds of the species in this guide are ennomines). Leaf- and needle-mimicking species tend to be green with a smooth surface. Twig mimics are gray to brown and heavily textured; most have warts or swellings that enhance their resemblance to bark, stipules, or other plant tissues and organs. In most genera the crochets are divided into two groups. The caterpillars appear to be especially dependent on silk: many lay down a strand wherever they walk; others dangle from foliage at night, suspended on a strand of silk; and most of the stick mimics attach a "belay" line before swinging their anterior ends out and away from a shoot.



Fall Cankerworm (*Alsophila pometaria*)

Although bewilderingly variable in coloration, this looper may be immediately recognized by its extra pair of midabdominal prolegs: a half-sized pair on A5. The ground color varies from pale green and yellow to black.

Commonly there is a whitish subdorsal stripe, or a more yellowed subspiracular stripe, or both. Greenish caterpillars may have a darkened middorsal (heart) stripe edged with white. Many forms have a black spot behind each spiracle. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, parks, orchards, and yards. Canada south at least to the Carolinas, west across most of the continent. One generation throughout its range. Connecticut: mature caterpillars in late May and June, common. Maryland: mature caterpillars up to a month earlier, common.

COMMON HOSTS Apple, ash, basswood, blueberry, boxelder, cherry, elm, maple, oak, and many other trees.

REMARKS Although routinely classified in the Oenochrominae, there is little to support its placement in this subfamily—we treat *Alsophila* as a primitive ennomine. Dark form caterpillars of the Fall Cankerworm are more prevalent under outbreak conditions, but how and when this color polymorphism is induced is not well-understood. Fall Cankerworm populations are a mixture of sexual and asexual females, with asexual females predominating in many areas. Asexual females mate, but discard the male genes, such that the resultant offspring are solely of the maternal lineage (Mitter and Futuyma 1977). The wingless females lay grayish eggs in batches on twigs and bark during late fall (New England) and winter (Mid-Atlantic States) that hatch early the following spring. The first instars spin down on a thread of silk and are blown (“balloon”) about the forest, and upon encountering a suitable host commence feeding. Most of our geometrids with flightless females are single generation species that are active as caterpillars in the early spring, and as adults in the early spring or late fall. Many tend to be unspecialized with regard to host tree species, but not with regard to foliage age—they require new leaves, high in nitrogen and water and low in tannins, to complete their development.



Virgin Moth (*Protitame virginalis*)

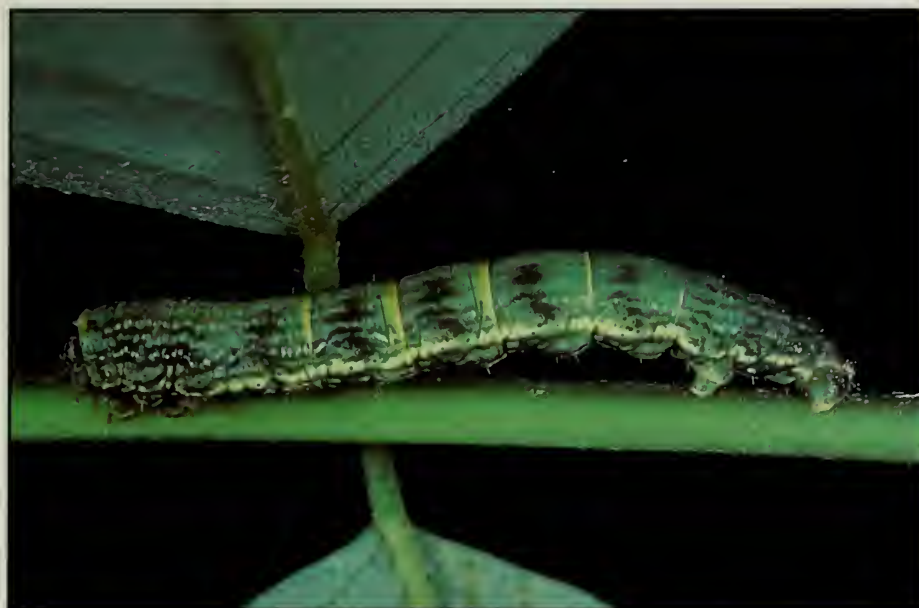
A broad reddish brown middorsal stripe with diffuse margins runs the length of this sea green caterpillar. The stripe dissipates over the head, ending before or forking to either side of the triangle. Below the triangle, the clypeus may share the same reddish brown coloration. A subventral flange runs between the thorax and anal proleg. The anal plate is broadly triangular, extending just beyond the body; the paraprocts are short and stubby. Mature larva to 2 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and edges of watercourses and wetlands. Canada south to Virginia east of the Appalachians, and south to the Gulf States and northern Texas west of the Appalachians, westward to the Rocky Mountain States. Connecticut and Maryland: two generations with mature caterpillars from June to July, then again from late August to October, locally common.

COMMON HOSTS Aspen, poplar, and willow.

REMARKS The red-brown coloration of the dorsal stripe is quite similar to that of the petiole color of aspen. We once observed a caterpillar resting with its anterior end attached to a leaf and the posterior end to the shoot—in this instance the resemblance of the dorsal coloration to a petiole was undeniable. Adults are active over a long period, from May to early August. Females readily come to light and oviposit if confined for a night or two. The pupa overwinters.



Stout Locust Looper (*Heliomata cycladata*)
[Common Spring Moth]



Green, stocky, and cylindrical, this caterpillar is distinguished by the faint dorsal stripes that run the length of the body and by its proportionately small prolegs. A thin yellow subspiracular stripe is best developed on the abdomen. Commonly, there are subdorsal purplish spots over the abdominal segments. The front of the head is flattened, and the vertex may be marked with purple or black. Below, look for a midventral yellow stripe with vague striping to either side. The paraprocts and hypoproct are essentially absent. Mature larva to 2 cm. Bo Sullivan recently discovered caterpillars of the Rare Spring Moth (*Heliomata infulata*) feeding on Bristly Locust in North Carolina. The caterpillars are magnificent by geometrid standards, bluish green with a broad, red-brown middorsal stripe.

DISTRIBUTION AND ABUNDANCE Woodlands, forest edges, and clearings. Extreme southern Canada to Georgia, Alabama, and Arkansas. One generation throughout its range. Connecticut: mature caterpillars in late June and July, locally common. Maryland: mature caterpillars up to a month earlier, very common.

COMMON HOSTS Locust; also reported from honey locust, although this needs verification.

REMARKS A proportionately large head and narrowed posterior end give the caterpillar a somewhat peculiar aspect. Frequently it rests on a leaf or stem with the head and thoracic legs touching the leaf surface and the anterior abdominal segments raised, looped well above the substrate. Black locust was originally native to the Appalachians and Ozarks, but has now spread throughout the East, taking the moth with it. The pupa overwinters.



Brown-bordered Geometer
(*Eumacaria latiferrugata*)



Stout in body, this handsome purplish to gray-brown inchworm has subtle pinstriping running the length of the body. Some individuals are nearly black, in these the striping is obscured. The spiracles are embedded in a darkened patch on the first two to five abdominal segments. Often towards the anterior of the abdomen, there are white subspiracular spots or lines along the lateral flange. The body is modestly swollen at the base of the third thoracic leg (especially when the caterpillar is at rest). A white line runs along the side of the head. The paraprocts and hypoproct are small. Mature larva to 1.5 cm.

DISTRIBUTION AND ABUNDANCE Riparian and floodplain forests, woodland edges, shrubby fields, sand plains, and beaches. Transcontinental in Canada, south in the East to Florida and Texas, although absent from many inland sites northward. Connecticut: absent. Massachusetts and Mid-Atlantic States: one principal summer generation with a partial second. Three or more generations occur in the South.

COMMON HOSTS Apple, cherry, and plum.

REMARKS In New England, the Brown-bordered Geometer is restricted to sand plains, barrens, and coastal areas. At Montague, Massachusetts, where black (*Prunus serotina*), pin (*P. pennsylvanica*), and sand (*P. pumila*) cherry grow side by side, caterpillars occur commonly only on the latter two hosts. During the day caterpillars sit exposed on leaves, “standing” with their anterior end held away from the substrate. When disturbed they are quick to release from the host plant. The larvae may feign death if handled, folding up their bodies with the head held against the prolegs. The pupa overwinters.



Mousy Itame (*Itame argillacearia*)

A caterpillar suitable for Halloween, this inchworm is intricately patterned in yellow or orange and black. One yellow to orange stripe runs down the dorsum and another passes through the spiracles. The spiracular stripe is interrupted by white patches, each of which contains two black setal bases, and on most segments a blackened spiracle as well. There is also a thin white subdorsal stripe. The shiny black coloration of the head is broken by up to five white lines that radiate from the top of the triangle. Mature larva under 3 cm.



DISTRIBUTION AND ABUNDANCE Open woodlands, heaths, balds, barrens, and bogs. Ontario and Quebec south to New Jersey and West Virginia. Connecticut: one generation with mature caterpillars from late May to June, local.

COMMON HOSTS Blueberry and cranberry and, especially, lowbush blueberry in New England.

REMARKS Like the Currant Spanworm (*Itame ribearia*), coloration of the Mousy Itame appears to be a warning. Since currant, blueberry, and cranberry are not generally regarded as toxic, one wonders about the chemical nature of the protection of these Itames, assuming, of course, that bright coloration only evolves after a caterpillar has acquired some measure of chemical protection (Sillén-Tullberg 1988). The egg overwinters.



Four-spotted Itame (*Itame coortaria*)

The body of this twig mimic ranges from green or tan to brick red. There are frosty lateral patches and dark rings around A1 and A5 to A8. Frequently paired whitish spots are present over the dorsum of the first four abdominal segments. The head is uniquely colored: the lobes are yellow, the top of the triangle is white but quickly blackens towards the middle. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Woodlands, parks, orchards, and yards. Much of southern Canada to Florida, Texas, and California. Connecticut: one generation with mature caterpillars from May to July, uncommon. Maryland: absent.

COMMON HOSTS Plants in the rose family such as apple, cherry, and hawthorn.

REMARKS The larva is an excellent twig mimic. The frosty patches resemble the waxy accumulations that are often found on the bark of woody shrubs and trees in the rose family. Similar frosty patches occur in a number of other distantly related geometrids (e.g., in *Prochoerodes* and *Tetraxis*). The egg overwinters, affixed to bark.



Blurry Itame (*Itame exauspicata*)

This handsome looper sports dorsal pin striping and pronounced spiracular marks. The ground color varies from greenish to gray or maroon as in the individual shown here. Look for black elliptical spots below each of the first six abdominal spiracles. The spiracles are sometimes embedded in yellowish spots. Fine black middorsal, addorsal, subdorsal, and supraspiracular stripes run the length of the body. The brown splotches on the head may form a herringbone pattern over each lobe; usually a black bar extends across the lower portion of the clypeus. Most setae are born from minute blackened bases. Both the paraprocts and hypoproct are short. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Barrens, woodlands, and forests. Transcontinental in southern Canada and northern United States, in the East south to West Virginia. Connecticut: absent. In western Maryland and Massachusetts there is one generation with mature caterpillars in May and June, locally common, but generally rare.

COMMON HOSTS Alder, birch, elm, hawthorn, hornbeam, poplar, and willow. Handfield (1999) lists numerous other (occasional) hosts.

REMARKS We are at a loss to explain why an insect with so many hosts should be so rare in collections. The three adults we have from Massachusetts came from different ecosystems: a high elevation bald, a pitch pine-scrub oak barren, and a woody wetland complex. Presumably the egg overwinters as is the case in other members of the genus.



Lesser Maple Spanworm (*Itame pustularia*)

A cream to yellow subdorsal stripe runs the length of this sea green (usually) to dull wine-colored caterpillar. On most individuals there is a slightly darkened middorsal stripe that is bounded on either side by a faint, often splotchy, addorsal stripe; a similarly vague supraspiracular stripe may be present as well. Below the poorly developed spiracular stripe, the ground color often has a yellow or orange cast. The green to tan head is unmarked. Segment A10 is stubby—the paraprocts, hypoproct, and anal plate are all small. Mature larva under 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, swamps, parks, and yards. Canada south to northern Florida, Alabama, and Texas. Connecticut and Maryland: evidently just one protracted generation with mature caterpillars principally from late May to July, with stragglers into August, abundant.

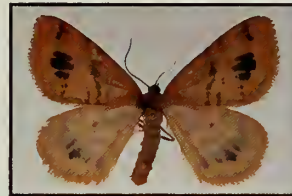
COMMON HOSTS Red maple.

REMARKS From the end of July through much of August the Lesser Maple Spanworm can be the most abundant moth at lights across southern New England. The caterpillars do most of their feeding at night from the undersides of leaves, where they are easily located by flashlight. Prepupal caterpillars are pinkish. The egg overwinters.



Currant Spanworm (*Itame ribearia*)

Each seta arises from a large black spot on this beautiful lemon yellow, frosty white, and black caterpillar. Fused black spots form a partial subventral stripe. The shiny black head has two white lines: a middorsal line extends into the top half of the triangle then divides and runs down to each antenna, and another line leaves the triangle and runs back towards the thoracic spiracle. Mature larva under 3 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, wooded swamps, and plantings. Alberta to New Brunswick south to Maryland, West Virginia, and northern Texas. Connecticut and Maryland: one generation with mature caterpillars from late May through June, local and rare in Connecticut, uncommon in Maryland.

COMMON HOSTS Currant or gooseberry.

REMARKS Formerly more widespread and abundant, the Currant Spanworm was a collateral victim of the currant eradication program that began in the 1920's and continued into the 1960's. Federal and State governments subsidized efforts to remove currant—especially the introduced black currant (*Ribes nigra*)—because currant is an alternate host for white pine blister rust. The Currant Spanworm is now generally uncommon to rare over many parts of its former range, and is best sought in areas that were largely inaccessible in the early parts of the 20th century. Where currants are grown commercially, the caterpillar is a pest that periodically reaches outbreak levels. When disturbed, the caterpillar drops from its perch, suspended by a strand of silk. Overwintered eggs hatch in the spring at about the same time that currant bushes are leafing out.



Barred Itame (*Itame subcessaria*)

Evidently there are two strikingly different color phases. The brown phase caterpillar has a body that is variegated in browns, white, and black with a shiny brown integument that is strongly mottled over A1 to A5. A thin subdorsal stripe runs from the thorax to the anal plate. Both the anterior proleg and at least the posterior half of the anal proleg are darkened. The head is reddened to either side of the midline and triangle. The second form, illustrated here, could scarcely be any more different: the lime-green ground color is broken by a yellow spiracular stripe that runs from the head to the anal proleg, and the lateral setae are borne from a shiny, dark, raised wart on A1-A5. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and shrub swamps. Manitoba to Newfoundland south to Mississippi and Iowa. Connecticut: absent. Massachusetts and West Virginia: one generation with mature caterpillars from late June into July, local and uncommon.

COMMON HOSTS Currant or gooseberry.

REMARKS On Spruce Knob, West Virginia, David Wagner and Eric Hossler collected green and brown *Itame* caterpillars alongside one another. The adults from both larval collections appeared to represent but a single species—those of the Barred Itame. Initially we were certain that we had either mislabeled our containers or that we had discovered a cryptic (or hidden) species of *Itame*. Neither proved to be the case: upon consulting McGuffin (1972) we learned that other *Itame* are known to have green and brown forms. As in other *Itames*, the egg overwinters.



Variegated Orange (*Epelis truncataria*)

Whether green, red, or purple, the caterpillar always has a conspicuous spiracular stripe that runs from the antenna back to the anal proleg—the spiracles touch the upper edge of this stripe. The body bears subtle addorsal, subdorsal, and supraspiracular stripes (all best seen with a hand lens); below these stripes the body is paler, and also well-striped. The head is unmarked. Segment A10 is short with reduced paraprocts and hypoproct. Mature larva around 1.5 cm.



DISTRIBUTION AND ABUNDANCE Peat bogs, heaths, or moorlike habitats. Alaska to Newfoundland and Labrador south in the East to New York, New Jersey, Michigan, Wisconsin, South Dakota, Colorado, and Idaho. Connecticut: one generation with mature caterpillars from late June into July, locally common.

COMMON HOSTS Bearberry, leather-leaf, and probably other Ericaceae.

REMARKS The spring-active adults fly by day with the Cranberry Spanworm (*Ematurga amitaria*) and Day Emerald (*Mesothea incertata*). The caterpillar is lethargic, moving slowly even when alarmed. It rests outstretched, usually along the axis of a shoot. The pupa overwinters.



Orange Wing (*Mellilla xanthometata*)

In both its green and brown forms the caterpillar bears numerous pinstripes. The middorsal and subdorsal stripes tend to be tawny, while the supraspiracular and subspiracular stripes are whiter and frequently broken into a series of spots. The subspiracular stripe is especially well-expressed on the thorax and from there runs to the antenna. The sides of the head are darkened above this stripe, at least in the darker form. Mature larva under 2 cm.



DISTRIBUTION AND ABUNDANCE Forests, parks, and roadside plantings. Extreme southern Ontario to New Jersey and Florida, west to Illinois and Texas. Connecticut: absent. Maryland and Ohio: at least three generations with mature caterpillars from late June through November, common.

COMMON HOSTS Honey locust but refuses black locust.

REMARKS This species is particularly common in the Midwest and South. Although the host has been widely planted throughout the East, the moth has not yet spread into many states where honey locust is now a common shade tree. The adults are active both day and night. Caterpillars are readily collected with a beating sheet. The pupa overwinters.



Common Angle (*Macaria aemulataria*)

More than 20 angles occur in the East, 15 of which are shown here. Larval coloration is variable; the wine-colored forms, common in the genus *Macaria*, occur in high-density (or especially captive-bred) populations.

The caterpillars are specialized in diet, and thus host determinations greatly facilitate identification. In Connecticut, the second and third generations appear to be facultative (partial); the third generation is often very small. The pupa overwinters in all eastern species. Definitive identifications should be based on reared adults. In our collections of the Common Angle, the ground color is either yellow or green, but we expect that the gray and red forms common to other Angles also occur. Some individuals have a black spot above the spiracle on A2. The ground color is darkest over the middorsum and above the spiracles and pale between the cream addorsal and subdorsal stripes. The thoracic and anterior abdominal prolegs are often reddish or brownish. Typically the head is without markings. Mature larva under 2.5 cm. Other similarly marked caterpillars include that of the Faint-spotted Angle (*Digrammia ocellinata*), a locust feeder, and the Promiscuous Angle (*Macaria promiscuata*), a specialist on redbud—host associations immediately distinguish the three.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Canada south to Florida and Texas and west to the Pacific Coast. Connecticut: at least two generations with mature caterpillars from June to October, common. Maryland: at least three full generations with mature caterpillars from May into November.

COMMON HOSTS Maples including boxelder.

REMARKS Records of this species from locust are erroneous (they were probably based on larval misidentifications of the Faint-spotted Angle, *Digrammia ocellinata*). Common Angle caterpillars, offered only locust, will starve to death. The caterpillars are quite similar: both are pale, vaguely striped, with a black spot over the spiracle on A2.



Birch Angle (*Macaria ulsterata*)

The glossy green to dark brown integument will usually allow recognition of this caterpillar. The lobes of the head, as well as the thoracic legs, are often darkened. Regardless of the ground color, there is frequently an elongate pale spot that extends forward from each of the abdominal spiracles. Mature larva under 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests. Transcontinental, in the East south to North Carolina (in mountains). Connecticut: presumably one generation with mature caterpillars from August to September, local and uncommon. Very common in the Appalachians from West Virginia to North Carolina.

COMMON HOSTS Alder and birch; Porter (1997) lists poplar and willow for the virtually indistinguishable European *Macaria notata*.

REMARKS The Birch Angle is a northern species that we have encountered when beating in the Adirondacks (New York) and Berkshires (Massachusetts).



Bicolored Angle (*Macaria bicolorata*)

The pine-feeding *Macaria* form a closely related set of species. All are somewhat glossy, green or reddish, with cream subdorsal and subspiracular stripes that run from the head back to the anal plate and proleg. The Bicolored Angle, Blurry Chocolate Angle (*Macaria transitaria*), and Granite Moth (*Macaria granitata*) occur side by side on hard pines. Caterpillars of the latter often have the subdorsal stripe subtended by fine purple-red or black stripes (that may fuse over much of their length). We are unaware of any characters that consistently distinguish the larvae of the Bicolored and Blurry Chocolate Angles. Adults of the three are markedly distinct. Mature larva under 2.5 cm. The closest relative of the Bicolored Angle is the Red-headed Inchworm (*Macaria bisignata*); though similar in appearance it is exclusively associated with white pine.



DISTRIBUTION AND ABUNDANCE Barrens and coastal plain communities in the Northeast. Missouri, Ohio, and Massachusetts south to Florida and Texas. Connecticut: absent. Massachusetts: at least two generations with mature caterpillars from June to November, locally common in pine woods. Maryland: there appears to be three generations with mature caterpillars from early June through November.

COMMON HOSTS Hard pines, such as pitch and Virginia pine.

REMARKS McGuffin's (1972) record of this species from jack pine refers to a different, and as yet, unnamed species. Pine-feeding Angle caterpillars commonly rest with their heads wedged in among needle bases by day.



Red-headed Inchworm (*Macaria bisignata*)

This white pine feeder often occurs alongside two other angles: the White Pine Looper (*Macaria pinistrobata*) and the Minor Angle (*Macaria minorata*). Their caterpillars, like those of all the eastern Angles on pine, are green with prominent subdorsal and spiracular stripes. Most caterpillars of the White Pine Looper may be identified by the thin dark stripes found immediately below the white subdorsal stripe. We are unaware of any feature that distinguishes the other two white pine-feeding Angles. See also comments made under the Bicolored Angle (*Macaria bicolorata*). Mature larva under 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and pine plantations. Southern Canada to Georgia, Alabama, and Missouri. Connecticut: at least two generations with mature caterpillars from June to November. Maryland: apparently three generations with mature caterpillars from June onward.

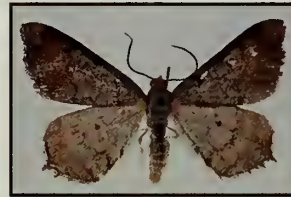
COMMON HOSTS White pine.

REMARKS *Macaria* are among the most commonly encountered caterpillars on conifers. In fall, large numbers can be found by beating foliage.



Minor Angle (*Macaria minorata*)

Three Angles are common on white pine: the Red-headed Inchworm (*Macaria bisignata*), White Pine Looper (*Macaria pinistrobata*), and the Minor Angle. Their larval stages are very similar. The Minor Angle caterpillar often has a more pronounced sea to blue-green cast and slightly broader white stripes than that of the Red-headed Inchworm. The White Pine Looper often has a more pronounced darkened stripe immediately subtending the white subdorsal stripe. In some individuals this dark stripe can be seen to be made up of two, fine, purple-red to black stripes. Like many Angles, this species also comes in a dull red form. The reddish to black patch on the head is inwardly edged with white. See comments under the Blurry Chocolate Angle (*Macaria transitaria*). Mature larva to 2 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and pine plantations. Southern Canada to Georgia and Alabama (in mountains). Connecticut and Maryland: two principal generations with mature caterpillars from late June into November, common.

COMMON HOSTS White pine.

REMARKS Angle caterpillars spin silk as they walk, and therefore have a ready belay line should they drop from the host.



Blurry Chocolate Angle (*Macaria transitaria*)

Closely related to the Minor Angle (*Macaria minorata*), this inchworm comes in both a green and a reddish form. The integument is somewhat shiny. The stripes, and especially the spiracular stripe, tend to be yellowed.

In our collections the subdorsal stripe is narrower than the spiracular stripe. Between the cream stripes the ground color is marked with a series of vague, wavy pinstripes. Mature larva under 2.5 cm. Indistinguishable (except by host association) from the Minor Angle which feeds exclusively on white pine. The caterpillars of two other Angles that specialize on hard pines, the Bicolored Angle (*Macaria bicolorata*) and Granite Moth (*Macaria granitata*) are closely similar. Caterpillars of the latter can often be recognized by the presence of fine purple-red to black lines immediately below the subdorsal stripe. Identifications of all pine-feeding Angles are best based on the reared adults.

DISTRIBUTION AND ABUNDANCE Barrens, woodlands, forests, and pine plantations. Canada south to northern Florida, Louisiana, and eastern Texas. Connecticut and Maryland: two principal generations with mature caterpillars from June to November, locally common.

COMMON HOSTS Hard pines, especially pitch, red, and Virginia pine in the East.

REMARKS The northern, red pine-feeding populations of the Blurry Chocolate Angle are patterned differently as adults; their status—whether subspecies or species—remains unclear.





Green Larch Looper (*Macaria sexmaculata*)
[Lesser Larch Angle]



Usually this looper is pale green with a white subdorsal and cream subspiracular stripe. In the last instar, a strikingly different form is common, this being mostly brown or maroon and strongly variegated with black and white—look for a black middorsal spot near the front edge of each abdominal segment. Mature larva under 2 cm. Owen's Larch Looper (*Macaria oweni*) co-occurs with the Green Larch Looper from northern New England into Canada. Owen's Larch Looper often has a well-defined dark stripe subtending the white subdorsal; in our examples of the Green Larch Looper this darker stripe is absent or poorly developed. The brown form of Owen's Larch Looper (figured in Ives and Wong 1988) tends to be less variegated, has more vague dorsal striping, and more conspicuous black patches about the spiracles. Larch is occasionally a host for a third Angle, the Spruce-fir Looper (*Macaria signaria*). The ground color of the Spruce-fir Looper is more blue-green and the stripes proportionately thinner.

DISTRIBUTION AND ABUNDANCE Boreal and Canadian zone wetlands, but also parks, yards, and other sites where larches are planted. Western Canada to Nova Scotia south in the East to Connecticut, Maryland, and the Great Lakes Region. Connecticut and Maryland: two generations with mature caterpillars from June to November, locally common; rare as far south as Pennsylvania and Maryland.

COMMON HOSTS Larch.

REMARKS At night caterpillars may dangle from larch needles, like little Christmas tree ornaments. By day, these same caterpillars rest within the needle clusters. Nearly every place where we have beaten larch, we have found Green Larch Loopers in abundance.



Hemlock Angle (*Macaria fissinotata*)

The caterpillar is bluish to sea green or dull red with a dark patch on each lobe of the head and a deep green middorsal stripe. Immediately below the subdorsal stripe the ground color is smoky green, and sometimes nearly black, then gradually lightens to the spiracular stripe. The anterior proleg is often flushed with purple. Mature larva under 2.5 cm. Spruce-fir Looper (*Macaria signaria*) and Hemlock Angle caterpillars may be indistinguishable; both eat hemlock. Identifications are best based on adult characters, which too can be difficult.



DISTRIBUTION AND ABUNDANCE Mesic woodlands and forests, parks, and yards. Canada south to Georgia (in mountains). Connecticut and Maryland: at least two generations with mature caterpillars from June to November, very common.

COMMON HOSTS Hemlock.

REMARKS Throughout New England this is one of the most common Angles at lights. All female Angles readily lay eggs if confined in a container with a sprig of host plant. The Hemlock Angle has expanded its range considerably as a result of ornamental plantings of its host.



Spruce-fir Looper (*Macaria signaria*)
[Pale-marked Angle]



Like other conifer-feeding Angles, the body of this caterpillar is green or blue-green with whitish subdorsal and spiracular stripes. Often a pair of thin, wavy black stripes run just under the subdorsal stripe. Each lobe of the head may bear a herringbone pattern of dark spots or a broad, ill-defined patch that extends to the antenna. Mature larva to 2.5 cm. Perhaps indistinguishable as a caterpillar from the Hemlock Angle (*Macaria fissinotata*). Identifications of these species should be based on adults.

DISTRIBUTION AND ABUNDANCE Conifer forests and bogs. Transcontinental in both Eurasia and North America, south in the East to Georgia and Alabama (in mountains) and the northern Great Lakes Region. Connecticut and Maryland: at least two generations with mature caterpillars from July to November, locally common.

COMMON HOSTS Fir, hemlock, larch, and spruce. Evidently pines and other conifers are also hosts, although many published host records for this species may represent misidentifications.

REMARKS Both the caterpillar and adult of the Spruce-fir Looper are rather undifferentiated and difficult to identify. The catholic diet of the caterpillars further complicates identification, although Angle caterpillars collected on spruce and fir usually will turn out to be this species.



White Pine Looper (*Macaria pinistrobata*)
[White Pine Angle]



This species is strictly associated with white pine. The caterpillar is pale green and well-marked with white. Reddish forms commonly show up in laboratory rearings. Both the subdorsal and spiracular stripes are relatively broad and well-defined—the spiracular stripes are often yellowed. Immediately below the subdorsal stripe, a smoky to dull red stripe carries onto the head as a dark patch over each lobe. All the legs may be flushed with purple. Mature larva under 2.5 cm. Two other Angles co-occur with the White Pine Looper on white pine, the Red-headed Inchworm (*Macaria bisignata*) and the Minor Angle (*Macaria minorata*). Most caterpillars of the White Pine Looper may be identified by the fine, purple-red to black stripes that subtend the dorsal stripe; these are absent in the other two.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, and pine plantations. Eastern Canada and the Great Lakes Region south to northern Alabama. Connecticut: at least two generations with mature caterpillars from June to November, very common. Maryland: there appear to be three generations.

COMMON HOSTS White pine.

REMARKS This species is to be expected wherever white pine grows in abundance.



Granite Moth (*Macaria granitata*)

Like so many other members of the genus, the caterpillar is green with a cream subdorsal and yellowish spiracular stripe. The dorsum and green area above the spiracles are often broken by vague, wavy stripes; the middorsal stripe is poorly differentiated. The green area below the subdorsal stripe is slightly darkened, and often subtended by two black or wine-colored pinstripes. Adult characters indicate that it is a close cousin of the White Pine Angle (*Macaria pinistrobata*). Host association provides one of the most reliable means of identification, as this species is a specialist on hard pines. Mature larva under 2.5 cm. The Granite Moth shares its hosts with two other Angles that specialize on hard pines: the Bicolored Angle (*Macaria bicolorata*) and the Blurry Chocolate Angle (*Macaria transitaria*). Both of these tend to lack the fine, purple-red to black stripes that subtend the subdorsal stripe. Identifications of all pine-feeding Angles are best based on reared adults.



DISTRIBUTION AND ABUNDANCE Barrens, woodlands, and plantations. Ohio to southern Quebec and Maine south to Georgia and Alabama (in mountains). Connecticut and Maryland: at least two generations with mature caterpillars from June to November, locally common.

COMMON HOSTS Hard pines, especially pitch and Virginia pine.

REMARKS This image illustrates how Angle caterpillars frequently rest with the head wedged near the base of a leaf fascicle. More importantly, it demonstrates how the red marks on the head, common to many conifer-feeding Angles, enhance their crypsis. When positioned near the base of a needle, the patch on each side of the head closely resembles the papery sheath that holds the needles in a bundle.



Many-lined Angle (*Macaria multilineata*)

Similar to the Curve-lined Angle (*Digrammia continuata*) below, both of these Angles are lime-green with broken white spots. In our collections, the middorsal stripe as well as the triangle tend towards deep green to black. The bases of the dorsal setae are not as prominent as in the Curve-lined Angle, nor is the magenta and yellow spiracular spotting as evident. On the head the markings over each lobe may form a darkened patch between the eyes and the triangle. The adults of these two moths are immediately separable. Mature larva under 2.5 cm.



DISTRIBUTION AND ABUNDANCE Woodlands, traprock ridges, fields, and pastures. Missouri and Illinois to Massachusetts south to Florida and Texas. Connecticut: at least two generations with mature caterpillars from late June to July, then again from August to November, local and uncommon. Maryland: apparently three generations with mature caterpillars from June onward.

COMMON HOSTS Cedars including red, Atlantic white, and northern white cedar.

REMARKS All of the pine-feeding Angles in the East bear continuous stripes that resemble the reflections that play off the needles upon which they feed. In contrast, both of the Angles that feed on the shorter scalelike leaves of cedars have the stripes broken into spots. The resemblance of the caterpillars to the foliage on which they are perched is so close as to make visual searching for caterpillars futile, especially relative to the numbers that can be obtained by beating.



Curve-lined Angle (*Digrammia continuata*)

The lime-green ground color and white spotting renders the caterpillar almost invisible against the leaves of its host. The subdorsal stripe is often well-developed, running uninterrupted over the thoracic and posterior abdominal segments; occasionally it is absent. A thin white middorsal stripe, if present, may carry forward onto the head and then intensify and divide about the triangle. The dorsal setae are frequently borne from conspicuously darkened bases. In some well-marked individuals, there are magenta and yellow (or cream) markings about each of the spiracles. These spots may form a broken spiracular stripe that carries to the antenna. Each lobe is marked with dark spots that form a herringbone pattern. Mature larva under 2.5 cm. Similar to the Many-lined Angle (*Macaria multilineata*).



DISTRIBUTION AND ABUNDANCE Woodlands, traprock ridges, fields, and pastures. Manitoba to Maine south to Florida and Texas. Connecticut: at least two generations with mature caterpillars from late June to November, locally common.

COMMON HOSTS Cedars, such as red and northern white cedar.

REMARKS Angles lay readily in captivity, especially after they have been fed once or twice with a solution of sugar and water.



Hollow-spotted Angle
(*Digrammia gnophosaria*)



Green, brown, or variegated, this caterpillar often has a dark splotch over the spiracles on A2 to A5. Some green individuals are nearly unmarked save for the yellowish spiracular stripe. The dorsum may be marked by thin, cream addorsal and subdorsal stripes. In heavily pigmented forms, the subdorsal stripe overlays a dark, diffuse stripe that runs from the antenna back to the rear of the body, where it is ill defined. There is often a flush of purple-brown about the prolegs or thoracic legs, or sometimes both. The conical paraprocts and hypoproct extend beyond the anal plate. Mature larva to 2 cm.

DISTRIBUTION AND ABUNDANCE Woodlands, wet meadows, swamps, and edges of watercourses. Montana, Wisconsin, and Ontario east to Nova Scotia (as vagrants) south to Florida and Texas; absent to rare over much of New England. Connecticut: two generations with mature caterpillars from late June to July, then again from August to October, rare. Maryland: three generations, locally common.

COMMON HOSTS Willow.

REMARKS According to Astrid Caldas (personal communication) most caterpillars rest by day on the undersides of leaves. Fewer can be found along petioles and shoots. The principal parasites include braconid wasps, ichneumonid wasps, and tachinid flies. Occasionally eulophid wasps also parasitize the caterpillars.



Locust Looper (*Digrammia ocellinata*)
[Faint-spotted Angle]



This yellow, green, gray, or reddish caterpillar has pale yellow-orange intersegmental areas, especially towards the rear of the body. There is often a black spot above the spiracle on A2. Numerous vague, wavy stripes, often broken into spots and bars, run the length of the body. Of these, the most developed is the cream subdorsal stripe. A reticulate network of irregular mottling ornaments the head. The thoracic legs and anterior proleg may be wine-colored. Mature larva to 2.5 cm.

DISTRIBUTION AND ABUNDANCE Woodlands, parks, late successional fields, and cities. Southern Canada to Florida, Alabama, and northern Texas. Connecticut: at least two generations with mature caterpillars from late June to October, locally common. Maryland: three generations with mature caterpillars from May to November.

COMMON HOSTS Locust and perhaps honey locust.

REMARKS This insect has benefited greatly from the popularity of one of its principal hosts, black locust, which has been planted extensively as an ornamental and timber tree. The tree and moth now occur widely throughout the East.



Four-spotted Angle (*Trigrammia quadrinotaria*)

The integument of this pale green caterpillar is translucent—the spiracular trunk being clearly visible within the body. While some caterpillars are virtually unmarked, others are variegated with diffuse purplish-brown patches, e.g., commonly there is a spot above some of the abdominal spiracles. Well-developed white subdorsal stripes and an interrupted spiracular stripe are often present. The latter tends to be more yellow in color and most evident toward over the anterior half of the abdominal segments. Body setae are relatively long and somewhat golden. The shiny, pale yellow- or orange-brown head may be unmarked, set with a single dark blotch on each lobe, or variegated with numerous spots. Both the paraprocts and hypoproct are short. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Woodlands and forests. Illinois to western Pennsylvania south to Georgia, the Florida panhandle, and eastern Texas. Connecticut: absent. In the southern Appalachians presumably there is one extended generation varying with elevation, with mature caterpillars from late June through August, locally common.

COMMON HOSTS Native buckeyes (larvae refuse horse chestnut, a common ornamental species).

REMARKS The caterpillars are unusually active, at least in early instars, readily dropping on silken threads when disturbed. Older larvae often come to rest stretched along the midrib (on the leaf underside). This is a classic Appalachian moth—in June its caterpillars may outnumber those of all other moth species on buckeye. The pupa overwinters.



Pale-veined Enconista (*Enconista dislocaria*)

The caterpillar's bright yellow dorsal and spiracular stripes are separated by a broad waxy subdorsal and supraspiracular area that is generously peppered with black spots that tend to be vertically elongate over the thorax. In our collections, there is a black splotch about the spiracles on A2 to A5. The tan head sports black spots. The paraproct and hypoproct are small. Mature larva under 2.5 cm.



DISTRIBUTION AND ABUNDANCE Woodlands, shrubby fields, and edges of watercourses. Ontario south through western Pennsylvania and Maryland to Florida, west to Arizona. Connecticut: absent. Ohio: one generation with mature caterpillars in early to midsummer.

COMMON HOSTS Hackberry.

REMARKS Generally uncommon in the Appalachian Region but becoming common southward and westward. Evidently overwinters as a pupa.



Pale Viburnum Geometer
(*Orthofidonia exornata*)



A dull reddish middorsal stripe broadens towards the rear of the caterpillar's bright lime-green body. There are often russet spots at the trailing edge of A2 to A5.

A thick reddened bar runs from the eyes back over the first thoracic segment; the vertex, to either side of the midline, is also marked with red. Both sets of prolegs are flushed with reddish purple. The paraprocts and hypoproct are short; the anal plate is rounded. The crochets are arranged in a single group with the outer two or three hooks enlarged. Mature larva to 2.5 cm. Three *Orthofidonia* occur in the East, and all feed on viburnum. Adults of *Orthofidonia tinctaria* are similar in appearance, hardly differing in genitalic characters; males have shorter setae along the antennal shaft. This northern species ranges south in mountains to North Carolina. Until the larval characters are better understood, identifications should be based on reared adults.

DISTRIBUTION AND ABUNDANCE Hudsonian and Canadian zone forests. Transcontinental in Canada, south in the East to Georgia (in mountains) and Missouri. Connecticut: one generation with mature caterpillars in late June and July, local and uncommon.

COMMON HOSTS Viburnum.

REMARKS The sides of the body wall are thin and essentially translucent; for example, many of the larger breathing tubes or tracheae are visible through the integument. Where the three *Orthofidonia* fly together, *O. flavivenata* is first on the wing, followed in a week or so by *O. tinctaria*, and then *O. exornata*. The caterpillar makes a loose cocoon in litter and passes the winter as a pupa.



Yellow-veined Geometer
(*Orthofidonia flavivenata*)



The translucent lime- to yellow-green body is sometimes marked with a pale subdorsal line that runs from the thorax to the last abdominal segment. Note the orange coloration of the spiracles. The greenish head has a broad brown or russet patch that extends from the antenna to the subdorsal area. To either side of the midline, the vertex may be marked with reddish brown. Mature larva to 2.5 cm. See comments made above under the Pale Viburnum Geometer (*Orthofidonia exornata*).

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Ontario to Nova Scotia south to Georgia (in mountains). Connecticut: one generation with mature caterpillars in June and early July, uncommon to rare.

COMMON HOSTS Viburnum, such as mapleleaf viburnum and wild-raisin.

REMARKS Caterpillars from our two collections of the Yellow-veined Geometer differ substantially in coloration. Caterpillars reared from a female from Albany, New York, are pale green and without reddish markings. The individual we figure here was collected as a late instar on Viburnum in Storrs, Connecticut. This is yet another genus in need of study. Descriptions and images of the caterpillars of the third species, *Orthofidonia tinctaria*, have not been published.



Sulphur Moth (*Hesperumia sulphuraria*)

Regardless of the ground color—which may be tan, gray, green, rose, or lavender—there is always a raised area above the spiracle on A2. The body may be faintly striped. Spots over each lobe of the head form a herringbone pattern; the lower half of the triangle and cheeks are lightened. Often a whitish elongate patch runs from the spiracle down the outside of the anterior proleg. A low ridge on A8 bears the anterior dorsal setae. Both the paraprocts and hypoproct are short. Mature larva to 3.5 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and shrubby habitats such as old burns. Southern Canada to Virginia and Missouri (and westward to the Pacific), absent from much of southern New England. Connecticut and Maryland: one generation with mature caterpillars from late May into early July, uncommon to rare in Connecticut but locally common in western Maryland.

COMMON HOSTS Many trees and shrubs including alder, birch, blueberry, cherry, cinquefoil, currant, dogwood, hemlock, huckleberry, larch, mountain ash, New Jersey tea, oak, rose, serviceberry, snowberry, and willow.

REMARKS We collected this species on three occasions by beating foliage in the late spring. Caterpillars may be clumped in their distribution—atop Mount Everett in southwestern Massachusetts most of the scrub oaks failed to yield any Sulphur Moth caterpillars, but one shrub produced four caterpillars. The egg overwinters.



Cranberry Spanworm (*Ematurga amitaria*)

The pale, undulating flange that runs through the spiracles distinguishes this chocolate-colored caterpillar. The ground color is significantly paler below this line, ranging from tan to white; subtle striping runs the length of the body (best viewed with a lens). When viewed with a lens, the integument appears roughened, especially about the anal plate and prolegs. The front of the head is flattened, without conspicuous patterning. The shape of the anal plate is diagnostic: triangular with a truncated apex; two prominent setae issue from its end. Both the anal plate and paraprocts extend well back from the anus. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Bogs, heathlands, and shrubby wetlands. Alaska to Nova Scotia south to Pennsylvania and Colorado. Connecticut: one generation with mature caterpillars from late June into August, locally common.

COMMON HOSTS Many trees, shrubs, and forbs including arborvitae, bayberry, bearberry, birch, blackberry, blueberry, bugleweed, chokeberry, cranberry, greenbrier, hemlock, huckleberry, larch, laurel, leather-leaf, loosestrife, maple, oak, rhododendron, spirea, sweet pepperbush, violet, and willow; there are even reports from wool grass and cotton grass; it is a pest of cranberry throughout much of its range.

REMARKS The young greenish caterpillars become progressively browner with each molt. At rest the caterpillars “stand at attention” with the head end raised and the body held rigid. Older caterpillars will also rest with the body appressed to a shoot. The caterpillars often reach high densities in managed cranberry bogs, destroying new leaves and flowers. Evidently, the pupa can withstand considerable flooding over the winter months. The adults are day-flying.



The Umber (*Hypomecis umbrosaria*)

This rather undifferentiated stick mimic is mottled in browns, grays, and white. There is a low ridge of dorsal warts over A2 and a lower set over A8. Vague subdorsal and supraspiracular stripes run the length of the body. Some individuals have darkened, V-shaped markings along the side of the body that point towards the venter. These spots are especially pronounced on A1 to A3. The spiracles are small given the size of the caterpillar; the paraprocts and hypoproct are moderately long. Mature larva under 4 cm. In Buchholz's Umber (*Hypomecis buchholzaria*) the body tends to be tan- to rusty-green with the dorsal and supraspiracular stripes broken up into spots; the abdomen lacks any warting or ridges. It is found in barrens and open oak woodlands along the Atlantic Coastal Plain into the foothills of the Appalachians; the caterpillars have been reared on gale, oak, and sweetfern. A third species, *H. gnopharia*, occurs from Michigan to New Jersey southward—we have not seen its caterpillar.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Wisconsin to the Cape Cod Region in Massachusetts south to Florida and Texas. Connecticut: absent. Maryland: two generations with mature caterpillars in late May into July, and again from late August until October, uncommon.

COMMON HOSTS Birch, oak, and probably many other woody plants.

REMARKS We are unfamiliar with the habits of this species in the Northeast. In England, the Great Oak Beauty (*Hypomecis roboraria*) has a single generation, overwintering as a small larva hunkered up against the bark. In spring the young caterpillars eat soft portions of the bark and newly expanding buds (Porter 1997).



Blueberry Gray (*Glena cognataria*)

The cylindrical caterpillar has a modest swelling about the spiracle on A2 that is often whitened forward and blackened rearward. The spiracle on A1 is appreciably lower than those that follow. Sometimes there are dark middorsal spots towards the front of each abdominal segment; a middorsal stripe, if present, is weakly developed. Each lobe of the head may be capped with black; a heavier black arc runs beneath these, over the triangle. The small dorsal warts over A8 may also be darkened. The paraprocts and hypoproct are of moderate length and the crochets occur in two groups. Mature larva to 3 cm (rarely to 3.5 cm).



DISTRIBUTION AND ABUNDANCE Oak and heath barrens and bogs, with open or sparse canopy. Canada south to Florida and Mississippi, but with large gaps in this distribution. Connecticut: historic. Massachusetts: one generation with mature caterpillars in July and August, generally rare, but locally common in open habitats with an abundance of heaths. Two or more generations southward.

COMMON HOSTS Blueberry and cherry (Dale Schweitzer, personal communication).

REMARKS Neither Forbes (1948) nor McGuffin (1977) had access to caterpillars of the Blueberry Gray, and hence our treatment may need revision once more material is examined. In southern New England this species is restricted to barrens and heathlands, while in Nova Scotia it occurs principally in bogs. The pupa overwinters.



Dotted Gray (*Glena cribrataria*)

Although adults of the Blueberry Gray (*Glena cognataria*) and Dotted Gray are abundantly distinct, their caterpillars are not. Both share a dropped spiracle on A1, a lateral swelling on A2, and low warts over A8.

They also have a swelling on A2 that is white anteriorly and black posteriorly. Vague striping, composed of interrupted light spots, may be evident at either end of the body. The Dotted Gray averages a bit larger, with the mature larva reaching 3.5 cm.

DISTRIBUTION AND ABUNDANCE Open woodlands, swamps, heathlands, and barrens, particularly those with an open or sparse canopy. Minnesota and Ontario to Vermont south to Florida and Texas. Connecticut: unclarified, either one or two generations, local and uncommon. Maryland: two generations.

COMMON HOSTS Birch, blueberry, cherry, maple, oak, poplar, serviceberry, willow, and other woody species; also reported from spruce.

REMARKS The Dotted Gray is apt to turn up in dry oak woodlands and barrens, whereas the Blueberry Gray is more often seen in heathy bogs and barrens. In barrens, expect the Blueberry Gray in the vicinity of wetlands. The pupa overwinters.





Cedar Gray (*Glena plumosaria*)

Perfectly suited for a life on cedar, the caterpillar is lime-green with conspicuous white spotting. The subdorsal stripe is broken into elongate spots, best developed at the front of each segment. When viewed from above, these spots form shallow triangles that point towards the midline. The white spiracular stripe is broken into short dashes, again most pronounced towards the front of each segment. Each abdominal spiracle is positioned on a low swelling. The head often bears a pale area to either side of the triangle; the sides of the head may be reddened. The paraprocts and hypoproct are small. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Open woodlands, fields, barrens, and swamps. Tennessee to New Jersey south to Florida. Connecticut: absent. New Jersey: at least three generations, although the second and third are partial, with mature caterpillars from July onward, very local.

COMMON HOSTS Atlantic white and red cedars.

REMARKS Although caterpillars of the Cedar Gray are superficially similar to those of two cedar-feeding Angles, the Many-lined Angle (*Macaria multilineata*) and Curved-lined Angle (*Digrammia continuata*), they are quite unrelated. It is a testament to the power of natural selection that these caterpillars have come to resemble each other so closely, simply because they share a common host. Moreover, there are hawk moths, owlet moths, and hairstreak caterpillars that feed on cedars and also share this coloration. The Cedar Gray may be immediately separated from the Angles by the shape of the head, the anterior face being quite flattened. Additionally, as in the other Glenas, the spiracle on A1 is dropped below the level of the other spiracles. The pupa overwinters.



Faded Gray (*Stenoporpia polygrammaria*)

The transverse warts over A2 are nearly connected over the dorsum; the larger lateral ones include the spiracle. The same warts occur on A3 but are smaller in size. Additionally, there is a set of hornlike swellings on A8.

Many of the body setae arise from pimplelike protuberances. Look for an oblique black line over the leg on T2. The head is flat-faced with angulate lobes, and there is often a transverse black splotch on either side of the apex of the triangle. The hypoproct is long, extending well beyond the length of paraprocts. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Barrens and woodlands. Southern Canada to Georgia and Arkansas, but rare or absent over much of the East. Connecticut: absent. Massachusetts: on Martha's Vineyard there is one generation with caterpillars maturing in September, locally common. North Carolina: at least two generations.

COMMON HOSTS Red and white oaks.

REMARKS The young caterpillars skeletonize patches of leaf tissue, i.e., they remove the epidermis and parenchyma and leave behind a network of vascular tissue (the leaf "skeleton"). Older larvae are nocturnal, resting along branches during the day, either with the thoracic legs attached or with the anterior end of the body raised, in which case the hindlegs are held out perpendicular to the body. In either position, the body is crooked with a downward kink near A2 and an upward kink between the second and third thoracic segments. The pupa overwinters.



Four-barred Gray (*Aethalura intertexta*)

The yellow, green, brown, or mauve body bears numerous ultrafine white stripes. Intercalated between the addorsal, subdorsal, suprspiracular, and subspiracular stripes there is often an additional weakly developed stripe. In the darker forms, look for alternating black and white subdorsal patches, especially over the anterior abdominal segments. The smooth body tends to be thickened about the thorax and tapered posteriorly. The head, either green or brown, is reticulated with white markings. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Wetlands, along watercourses, woodlands, and forests. Transcontinental in Canada south to Georgia and Missouri. Connecticut: two generations with mature caterpillars in June and July, then again in August and September, locally common. One generation northward.

COMMON HOSTS Alder and birch.

REMARKS The female deposits the eggs in small groups on unfolding leaves (McGuffin 1977), which suggests that the early instars feed preferentially on new growth. Alder and birch have indeterminate growth, producing new leaves throughout the growing season, hence even second generation caterpillars have access to young leaves well into September. The larva rests fully extended along a leaf. The pupa overwinters.



Brown-shaded Gray (*Iridopsis defectaria*)

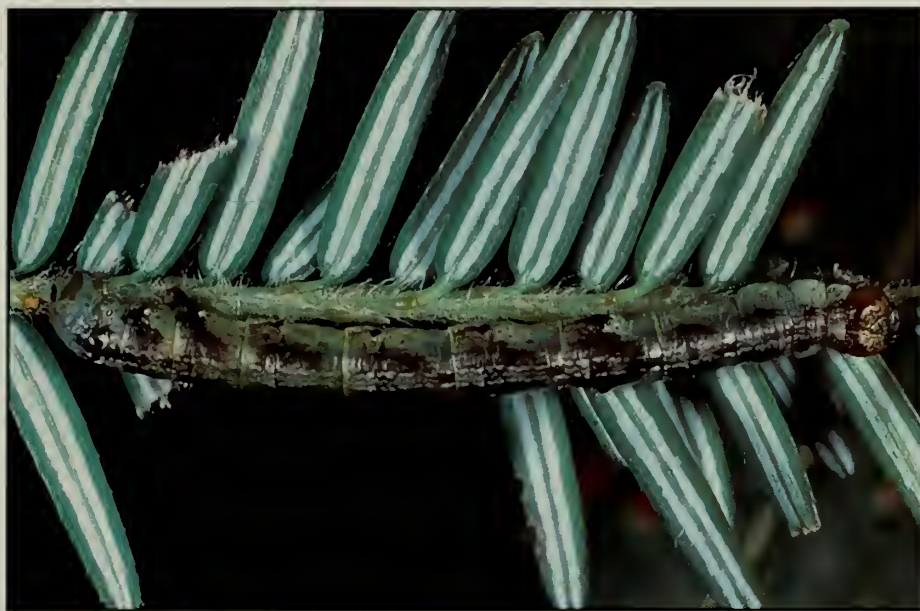
The most conspicuous feature of this looper is the ridge connecting two of the dorsal setae over A2. The spiracle on this segment is perched on a low swelling that may be blackened or lightened. In the individual figured here, the purplish ground color is broken by numerous, irregular dark lines and pale spots. There are small, pimplelike warts over A8. The front of the head is flattened, pale-colored, with a brown frame that extends between the lobes and runs down to the eyes. The paraprocts and hypoproct are relatively small. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Barrens, woodlands, and forests. Kansas to Ohio and New Jersey south to Florida and Texas. Connecticut: absent. Maryland: at least two generations with mature caterpillars from May to November, locally common.

COMMON HOSTS Cherry, gale, oak, poplar, walnut, willow, and probably other woody plants.

REMARKS Our experience with the Brown-shaded Gray is based on the collection of a single larva that was taken while beating. Certainly, our diagnosis will need to be refined as other collections are considered. Evidently the pupa overwinters.



Pale-winged Gray (*Iridopsis ephyraria*)

The body is green, gray, brown, or rust with a lateral wart on A2 and a modest hump over A8. The wart on A2 is often darkly colored. Like other members of the genus the head is abruptly flattened; the anterior face is mottled but distinctly lighter than the lateral and dorsal areas. In most individuals the lobes are patterned. The body is subtly marked with middorsal, addorsal, subdorsal, supraspiracular, adventral, and midventral stripes. In some forms the dorsum is marked with brown over T2 and T3 as well as A2 and A3. Often there is a dark spot behind each of the abdominal spiracles. In our example the legs and posterior abdominal segments are flushed with pink or orange. The paraprocts and hypoproct are small. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Southern Canada to Georgia and Alabama (in mountains) and Texas. Connecticut: one generation with mature caterpillars in June and July, locally common. Maryland: caterpillars mature as early as May, uncommon, local.

COMMON HOSTS Many broadleaf shrubs and trees including ash, birch, cherry, cranberry, currant, maple, pear, oak, viburnum, and willow; also fir, hemlock, and other conifers.

REMARKS Unlike other *Iridopsis*, this species overwinters as an egg.



Small Purplish Gray (*Iridopsis humaria*)

This is one of the East's most distinctively colored inchworms: the dorsum is mostly purple-brown with faint longitudinal striping; the sides and venter are yellow-green to straw-colored. It is a stout looper, rather wide given its length. A broad black subdorsal stripe runs from the head to the posterior end of the abdomen where it weakens in intensity. Often there is a dark spot behind the spiracle on A2. The head is tricolored: brown above and greenish or yellow below the broad black lateral stripe. The paraprocts and hypoproct are relatively small. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Alberta to Nova Scotia south to Florida and Texas, but absent from many areas, e.g., much of New England. Connecticut: one principal generation with mature caterpillars from June to early August, and at least a partial second generation with mature caterpillars from late August to October, very local and uncommon. Maryland: at least two full generations.

COMMON HOSTS Birch, cranberry, dewberry, hickory, oak, pear, pecan, persimmon, sweetfern, and walnut, as well as a number of forbs including asparagus, clover, goldenrod, and soybean.

REMARKS The pupa overwinters.



Bent-line Gray (*Iridopsis larvaria*)

We often fail to recognize this common looper because of its variable appearance. The ground color is usually green, but some individuals are brownish. In many of its forms, a series of dark red to brown dorsal spots forms a diamond-shaped saddle over A2; occasionally a dark mid dorsal stripe runs the length of the body; other individuals are without dark markings. The spiracles are whitened. Behind the spiracle on A2, look for a low wart; sometimes A3 also has a hint of this swelling. Another small wart occurs over the dorsum of A8. The anterior proleg is often flushed with pink or brown. The front of the head is flattened, and either unmarked or with a broad purple brown band over the top of the head that narrows to the eyes and frames the "face." The base of the leg on T3 is swollen. The crochets are in a single group. Mature larva under 3 cm. In many respects the caterpillar resembles that of the Pale-winged Gray (*Iridopsis ephyraria*).



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Eastern Canada south to Georgia, the Gulf States, and Midwest but absent from Texas. Connecticut and Maryland: two generations with mature caterpillars in late June and July, and again from late August until November, very common.

COMMON HOSTS Alder, apple, birch, cherry, currant, dogwood, elderberry, goldenrod, hawthorn, mountain ash, poplar, senna, sweetfern, viburnum, willow, and many other plants.

REMARKS Larvae often rest on leaves with the body looped upward and the head touching the substrate. The pupa overwinters.



Cypress Gray (*Iridopsis pergracilis*)
[Black-shouldered Gray]



Highly variable in color, this looper ranges from pale green to dark brown; the anterior end of each abdominal segment is somewhat narrowed. The lateral area of T2 is slightly swollen, as is the dorsum of A8. There are thin, often interrupted addorsal, subdorsal, and supraspiracular stripes. The head is mottled with pronounced markings over the lobes and across the lower part of the triangle. The paraprocts and hypoproct are small. Mature larva to 2.5 cm.

DISTRIBUTION AND ABUNDANCE River swamps and kettle holes in barrens. Missouri, Maryland, and Delaware south to Florida and Texas. Connecticut: absent. Maryland: at least three generations with mature caterpillars from May until the first hard frost, often common in cypress swamps.

COMMON HOSTS Baldcypress.

REMARKS Occasionally a pest that defoliates thousands of acres of cypress forest. The pupa overwinters.



Large Purplish Gray (*Iridopsis vellivolata*)

The abdomen of this corrugated red-brown twig mimic has an inconspicuous ridge connecting two of the dorsal setae over A2 to A5; even more subtle ridges may be found over A1, A6, and A7. The abdominal spiracles are positioned on raised lateral warts that are often pale forward of the spiracle and darkened behind. A wavy ridge, often cream, runs beneath the abdominal spiracles. Many individuals are streaked with numerous vague, fine stripes running the length of the body, especially above the level of the spiracles. Below the spiracles the body is mostly pale and unmarked. Each lobe of the head may be framed by a thin cherry-red band. The crochets are in a single group. Both the paraprocts and hypoproct are of moderate length. Mature larva to 3.5 cm. Caterpillars of the Northern Pine Looper (*Caripeta piniata*) are similar in appearance but have the crochets separated into two groups.



DISTRIBUTION AND ABUNDANCE Barrens, forests, and woodlands. Eastern Canada, south to Florida and eastern Texas. Connecticut: one generation with caterpillars maturing from July to September, common. New Jersey and Maryland: two generations. Three or more generations in the Deep South.

HOSTS Pine, also fir, larch, and spruce.

REMARKS Caterpillars of the Large Purplish Gray are remarkably twiglike in appearance. Perhaps the most interesting aspect of their background-matching repertoire is the textural mimicry of the body—the abdominal bumps and ridges are not unlike the scars one finds on a conifer twig that has dropped its needles. The pupa overwinters.



Common Gray (*Anavitrinella pampinaria*)

Highly variable coloration and undistinguished form make this inchworm somewhat difficult to recognize. Many individuals are marked with a dark middorsal V or closely set black stripes over the thoracic segments and dark middorsal spots on A2 to A4. Look for a lateral swelling that includes the spiracle on A2. The dorsum of A8 has a pair of closely set, darkened, pointed warts. The head is somewhat square with a flattened front and shallowly cleft vertex; usually there is a dark bar across the top of the triangle. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Many habitats including forests, woodlands, fields, and waste lots. Transcontinental in Canada, in the East south to Florida and Texas. Connecticut and Maryland: at least two extended generations with mature caterpillars from late May through October, very common.

COMMON HOSTS Highly varied in its diet, consuming evergreens, broadleaf trees, shrubs, and forbs. A few of its recorded hosts include alder, apple, birch, blueberry, carrot, chinaberry, cotton, cranberry, Douglas fir, goldenrod, larch, locust, maple, oak, orange, raspberry, soybean, spruce, and willow.

REMARKS In addition to the range of hosts listed above, we have found and reared the Common Gray on grass. There is even a report of a caterpillar from ginkgo, an ancient Chinese softwood almost universally shunned by New World Lepidoptera. The Common Gray is one of the most common geometers in sweep samples from open fields. The pupa overwinters.



Projecta Gray (*Cleora projecta*)

The most conspicuous features are the black middorsal spots on A2 to A4, each of which is flanked with white laterally. There are no prominent warts or swellings, although A8 is slightly humped. The addorsal, subdorsal, and suprspiracular stripes are doubled. In some forms the white spiracles are embedded in a yellowish patch that is commonly followed by a black spot, largest on the second abdominal segment. The head may be heavily mottled with dark spots that form a herringbone pattern over the lobes. The anal plate is rounded; the paraprocts and hypoproct are modestly developed. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Southern Manitoba and Ontario south to Florida and Texas, but absent from many areas within this range. Absent from Connecticut, Maryland, and much of New England. New Jersey: one generation with mature caterpillars in June and July, uncommon.

COMMON HOSTS Cherry, gale, oak, and possibly many other woody plants.

REMARKS The pupa overwinters in both eastern *Cleora*.



Double-lined Gray (*Cleora sublunaria*)

The few caterpillars that we have seen were greenish with distinct black spots, bracketed with white, near the leading edge of A2, A3, and A4. The middorsal (heart) stripe is darker than the ground color and there are faint addorsal, subdorsal, and supraspiracular stripes. Often there is a dark spot behind each abdominal spiracle—it is especially evident on A2. An outer black ring encircles each of the whitish spiracles. The anal plate is rounded; the paraprocts and hypoproct are modestly developed. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Manitoba to Illinois and New York south to Florida and Texas; absent from much of New England. Connecticut and Maryland: one generation with mature caterpillars from late May into July, uncommon to rare.

COMMON HOSTS Cherry, chestnut, oak, sweetfern, and likely many other plants.

REMARKS We encountered *Cleora* caterpillars on several occasions while sampling spring foliage in the foothills around Goshen, Virginia. Here is yet another genus for which our knowledge remains inadequate and efforts to rear and photograph the immature stages are needed. The pupa overwinters.



Saddleback Looper (*Ectropis crepuscularia*)
[The Small Engrailed]



The variously mottled body of this looper ranges from red and purple to brown. The top of T2 and venter of T3 (especially where the legs are attached) are swollen. Perhaps the best feature for recognizing this variable caterpillar is the low, dark-edged, V-shaped ridge over the dorsum of A8. The head is flattened and often darkly pigmented about the upper portion of the triangle. Some individuals have a darkened saddle over A4 and black lines beneath the spiracles on the abdomen, while others are unmarked. Mature larva to 3.5 cm.

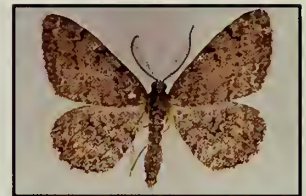
DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada, south in the East to Florida and Texas. Connecticut: two generations with mature caterpillars from June to July, then again from August until October, common. Maryland: at least three broods with mature caterpillars from April to the first hard frost.

COMMON HOSTS Many hardwoods and softwoods including apple, ash, birch, blackberry, cherry, cranberry, currant, fir, hemlock, larch, maple, oak, pear, poplar, spruce, sweetfern, walnut, witch-hazel, and willow.

REMARKS An excellent twig mimic in form, coloration, and posture. The caterpillar rests with the anterior end of the body elevated. A strand of silk is laid down wherever the caterpillar goes, so that at any instant the larva can drop from its perch on a safety line. The pupa overwinters.



Dashedlined Looper
(*Protoboarmia porcelaria*) [Porcelain Gray]



The gray, brown, or reddish ground color is variegated with white, brown, and black. The most distinctive feature is the rounded, subspiracular swelling on A2—it is often pale anteriorly and blackened posteriorly. Prominent creases encircle each segment, and are especially pronounced about the thorax. A multitude of minute spines, visible with a hand lens, are scattered over the body. The venter is pale and mostly unmarked. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada, in the East south to Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars from April to June, then again in July and August, very common.

COMMON HOSTS Softwoods such as fir, hemlock, larch, and spruce, but also pine; also many hardwoods and shrubs including birch, blueberry, currant, elm, maple, mountain holly, oak, poplar, and willow.

REMARKS At rest the body is straight with the anterior end held away from the substrate. The late instar larva overwinters fully exposed on twigs and bark. Should a caterpillar show up on your clothing after leaf fall, it will most likely be this or a *Hypagyrtis* species. Dashedlined Loopers are an important food source for insectivorous birds that winter in the eastern forests. It can be very common in springtime collections, second only to *Hypagyrtis* species.



Tulip-tree Beauty (*Epimecis hortaria*)



An oddly proportioned, stout caterpillar that is not apt to be confused with any other. The body is widest about T3 and A1 and noticeably swollen about the last thoracic leg and anterior proleg. The thoracic segments, short and bunched together, bear comparatively small legs. The ground color is highly variable, ranging from nearly yellow or mauve to gray, chocolate brown, or black; frequently there are vague pinstripes running the length of the body. The pale head is overlaid with a collage of dark spotting. In the examples that we have seen, the spiracles are orange with a thin outer black ring. Mature larva to 4 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Southern Ontario to Maine south to Florida and eastern Texas. Connecticut: one generation with mature caterpillars from late June to early August, common. Maryland: two generations with mature caterpillars in May and June, then again from August into November.

COMMON HOSTS Magnolia, redbay, sassafras, spicebush, and tulip-tree.

REMARKS The larva often rests looped, with the anterior abdominal segments raised above the leaf or stem to which it is attached. The pupa overwinters.



Variable Redmarked Looper (*Melanolophia canadaria*) [Canadian *Melanolophia*]



Although abundant throughout the East, this inchworm is difficult to characterize. In the last instar the body is pale green, often with cream to yellow striping, and rarely reddish middorsal and supraspiracular splotches. About nine shallow creases encircle each anterior abdominal segment. The integument is often yellowed where adjacent abdominal segments telescope into one another. With a hand lens, look for a wavy flange that runs just below the abdominal spiracles; often it is highlighted with cream, and less commonly with pink or red. Some individuals have a subdorsal stripe, or at least the vestiges of a stripe running over the thoracic shield. The middle instars are yellow-green and more conspicuously striped: most have well-developed subdorsal and yellow spiracular stripes, as well as thinner white addorsal and supraspiracular pinstripes; in addition, the head tends to be more yellow or orange. The crochets are in one group. Mature larva to 3 cm. We are unaware of any reliable characters that will distinguish this caterpillar from those of the closely related Signate *Melanolophia* (*Melanolophia signataria*)—also known as the Striped Green Looper—with which it co-occurs over most of its range.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Throughout the East. Connecticut: two generations with mature caterpillars in June and early July, then again from August to October, abundant. Maryland: at least two broods with mature caterpillars from April to June, then again from August until the first hard frost.

COMMON HOSTS Alder, ash, basswood, birch, blackberry, blueberry, cherry, dogwood, elm, hackberry, hickory, honey locust, larch, magnolia, maple, oak, pine, poplar, redbud, sassafras, serviceberry, spirea, sumac, sycamore, viburnum, walnut, willow, and many other woody trees and shrubs.

REMARKS *Melanolophia* are among the most frequently encountered geometrid caterpillars. They feed mostly at night, resting by day on the undersides of leaves. The caterpillar may dangle from a 1-3 cm strand of silk for many hours during the night. To climb back up, the caterpillar seizes the line with its mandibles, cranes the head backward, reaches upward with rear thoracic legs, then pulls itself upward, to again lock onto the line with the mandibles, repeating the process until it can grab a leaf or twig. The pupa overwinters.



Pine Powder Moth (*Eufidonia convergaria*)

The deep green ground color of this caterpillar closely resembles that of the foliage upon which it feeds. Anterior abdominal segments have approximately 8 annulations. The middorsal stripe is dark green, the subdorsal stripe cream, and the spiracular stripe white and about twice the width of the other two. Below, the pale venter is marked with three pale, powdery stripes. In our collections, the green head is essentially unmarked except for the cheeks, which are yellowed where the spiracular band continues to the eyes. The spiracles frequently have an orange or yellow cast. All of the Powder Moths have the crochets in a single group. Mature larva to 2.5 cm. Caterpillars may be indistinguishable from those of the Powder Moth (*Eufidonia notataria*).



DISTRIBUTION AND ABUNDANCE Pine barrens, woodlands, and forests. Southern Canada to North Carolina (in mountains). Connecticut and Maryland: one generation with mature caterpillars from July to September, locally common.

COMMON HOSTS White pine, but possibly other conifers as well.

REMARKS The caterpillar rests with the body flat against a needle. Early instar caterpillars prefer young needles. The pupa overwinters.



Sharp-lined Powder Moth
(*Eufidonia discospilata*)



The somewhat flattened body—at least when viewed from the side—is grass green with several fine stripes along both the dorsum and venter. Anterior abdominal segments have 10 annulations. The most prominent feature is the cream spiracular stripe, which is frequently edged below with pink or scarlet, and runs from the antenna to the anal plate. Spots over each lobe of the head form a herringbone pattern. The spiracles are yellowed. Mature larva to 2.5 cm. Although similar in color to the Great Variegated Pug (*Eupithecia ravocostaliata*), it is easily distinguished by its shorter paraprocts—all *Eupithecia* have proportionally long paraprocts.

DISTRIBUTION AND ABUNDANCE Hudsonian and Canadian zone forests, bogs, and heathy barrens. Across much of Canada south to Pennsylvania, western Maryland, and the northern Great Lakes Region. Connecticut and Maryland: one generation with mature caterpillars from late June to July, locally common.

COMMON HOSTS Many shrubs and trees including alder, birch, blueberry, cherry, hawthorn, Labrador tea, laurel, meadow-sweet, viburnum, and willow.

REMARKS The adult moth is mostly diurnal, but some individuals come to lights. In New England the spring-active adults are commonly seen flying over bogs with the Day Emerald (*Mesothea incertata*) and Variegated Orange (*Epelis truncataria*). Young caterpillars skeletonize patches of tissue from the lower side of the leaf. The pupa overwinters.



Powder Moth (*Eufidonia notataria*)

We are unaware of any morphological or coloration characters that reliably distinguish the caterpillars of this species from those of the Pine Powder Moth (*Eufidonia convergaria*). Both have a dark middorsal stripe, thin yellow to cream subdorsal stripe, and a broad white spiracular stripe, and approximately 8 annulations running over the anterior abdominal segments. According to McGuffin (1977), the spiracular stripe may be edged with pink as in the Sharp-lined Powder Moth (*Eufidonia discospilata*), especially about the thorax. Often there is a subventral stripe running between the thorax and prolegs. Mature larva to 2.5 cm. Host associations should distinguish the three Powder Moths treated here; short of that, genitalic dissections may be necessary.



DISTRIBUTION AND ABUNDANCE Conifer forests and woodlands. Canada south to Maryland and West Virginia (in mountains), Ohio, and Missouri. Connecticut and Maryland: one generation with mature caterpillars from early July to September, uncommon in Maryland, but very common from Connecticut northward.

COMMON HOSTS Fir, hemlock, larch, spruce, and other conifers.

REMARKS Adults can be encountered by day or night. Females lay individual eggs, or groups of eggs, at the bases of young needles. The pupa overwinters.



Cleft-headed Looper (*Biston betularia*)
[Pepper-and-salt Geometer]



The large body size and deeply cleft head distinguishes this looper from all others in the East. Minute black spines—visible through a hand lens—pepper the greenish, gray, or brown body. A5 has a pair of conical warts just above the spiracle. Another pair of warts sits atop A8. On T1 low ridges are positioned behind the clefts of the head. The spiracles often have a distinctive orange cast. Mature larva very large, to 7 cm.

DISTRIBUTION AND ABUNDANCE Barrens, woodlands, and forests. Transcontinental in Canada south to Georgia (in mountains), Texas, Arizona, and California. Connecticut: evidently just a single protracted generation with mature caterpillars from July to November. Maryland: two generations with mature caterpillars from July until the first hard frost.

COMMON HOSTS Many trees and shrubs including alder, apple, birch, blueberry, cherry, cranberry, currant, dogwood, elm, hackberry, larch, locust, maple, mountain ash, New Jersey tea, oak, pecan, poplar, redbud, rose, walnut, and willow.

REMARKS The adult, which goes by the name of the Pepper-and-salt Geometer, has been the subject of considerable evolutionary study. This moth provides the most famous textbook example of microevolution. The adults, which sometimes perch on bark by day, come in dark and pale color forms. In areas where there are few lichens on trees—e.g., in forests impacted by industrial pollution and fire—moths are often dark or melanic. In the presence of abundant lichens and light-colored bark, genes for lighter coloration are favored. Birds are thought to be the evolutionary engine, preying more heavily on the form that is less well-matched to its background. The pupa overwinters in forest floor litter.



Twilight Moth (*Lycia rachelae*)



This species and the two that follow are among the most splendid eastern geometer caterpillars. The gray to mauve ground color of the Twilight Moth caterpillar is marked with black, white, and yellow. The head, anal plate, and posterior half of the anal proleg are white with black spots. A cream stripe runs through the spiracles; often there is a yellow to orange spot behind each of the black spiracles. The leading edge of the prothoracic shield and abdominal segments also may be marked with yellow. Under a lens, numerous minute, flattened plates can be seen covering the integument. The anterior proleg has only 35 to 42 crochets, whereas that of the Stout Spanworm (*Lycia ursaria*) bears 45 to 55 crochets (McGuffin 1977). Mature larva to 5 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Alaska to Quebec and Maine south to Pennsylvania and Colorado. Connecticut: absent. Pennsylvania: one generation with mature caterpillars from July to September, rare.

COMMON HOSTS Many trees and shrubs including alder, birch, cherry, dogwood, elm, hazelnut, poplar, serviceberry, and willow.

REMARKS Adults emerge in very early spring, often when snow is still on the ground. Since *Lycia* females are flightless, it is the first instar caterpillar, “ballooning” on a silken thread, which carries the burden of dispersal. The pupa overwinters in *Lycia*. The Twilight Moth is listed as a threatened species in Maine.



Stout Spanworm (*Lycia ursaria*)

At arm's length, this spanworm verges on plebeian, but on closer inspection, it ranks among the most handsome. Numerous black-edged stripes cut through the smoky lavender to purple ground color. There is a distinctive red to pink flush to the head and legs. The leading edge of T1 is yellowed. On many individuals, there are raised yellow subdorsal and lateral spots along the back edge of the anterior abdominal segments; the spiracles may also be yellowed. The integument is peppered with minute convex plates; in the Twilight Moth (*Lycia rachelae*) these plates are more flattened. Mature larva less than 5 cm.



DISTRIBUTION AND ABUNDANCE Orchards, woodlands, and forests. Canada south to New Jersey and Missouri. Connecticut: one generation with mature caterpillars from July to September, uncommon to rare.

COMMON HOSTS Alder, ash, birch, cherry, cranberry, elm, maple, oak, poplar, willow, and other woody plants.

REMARKS *Lycia* emerge, mate, and lay eggs in early spring, well-ahead of bud break. The newly hatched caterpillars are poised to begin feeding as soon as the buds open. Yet development is slow, with many individuals not maturing until late summer. How such slow-growing larvae manage to survive the daily pressures from birds and parasitoids for as long as five months is bewildering.



Woolly Gray (*Lycia ypsilon*)



The robust body is marvelously patterned with yellow, maroon, black, and white. A tan middorsal stripe is sandwiched between two white addorsal stripes that often bear spurs that dip down towards the spiracles.

The subdorsal and subventral areas are maroon or brick red. The most prominent feature is the broad, irregular spiracular stripe, composed of alternating white and yellow patches. Dark spots are showered over the head, but there are no large blackened patches; likewise the prolegs and anal plate are peppered with black spots. The venter sports a yellow stripe. Mature larva to 5 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands, except northward where it is restricted to barrens. Minnesota to Martha's Vineyard, Massachusetts, south to Florida and Texas. Connecticut and Maryland: absent. Massachusetts: one generation with mature caterpillars in July and August, rare. Common in the Southeast.

COMMON HOSTS Apple, cherry, oak, and presumably many other woody plants.

REMARKS The bright coloration stands in marked contrast to that of the Stout Spanworm (*Lycia ursaria*) which, although striking in its own right, is far more subtle and without bright colors. The adaptive significance of the Woolly Gray's coloration, assuming it has been crafted by natural selection, escapes us. The strong thoracic legs are always engaged with either a leaf or stem.



Pine Measuringworm (*Hypagyrtis piniata*)
[Pine Variant]



The ground color is a mottling of green, yellow, tan, white, brown, and black. In some individuals the dorsum of the abdomen is marked with a series of greenish or pale brown arrowhead marks (as figured here). Laterally, the black mottling is often heaviest about the spiracles; a pale patch often separates these pigmented spiracular areas. The dorsum of A8 is slightly humped, and often stamped with a small, white subdorsal spot. Each lobe of the head is heavily mottled; the front is often lightened except for a transverse band that runs through the top of the triangle. Commonly, the spiracles are white or pale brown with an outer black ring. The paraprocts and hypoproct are short. Mature larva to 3.5 cm.

DISTRIBUTION AND ABUNDANCE Coniferous woodlands and forests. Transcontinental in Canada south in the East to Maryland and Georgia (in mountains) and Great Lakes Region. Connecticut and Maryland: two generations with mature caterpillars in May and June, then again in July and August, locally common.

COMMON HOSTS Fir, hemlock, larch, pine, and spruce.

REMARKS *Hypagyrtis* is a taxonomically difficult genus. Our assignment of names is based on the assumption that the Pine Measuringworm is a northern species with a preference for spruce, hemlock, and related conifers, and that in barrens and coastal plain communities this species gives way to the Esther Variant (*Hypagyrtis esther*), which occurs south to Georgia and Texas. Rearing records suggest that pines are a preferred host for the Esther Variant (although both species accept a broad range of conifers). In all Variants (*Hypagyrtis*) the larva overwinters exposed on bark or foliage.



One-spotted Variant (*Hypagyrtis unipunctata*)



What may be the most widely encountered inchworm in the East is frustratingly difficult to characterize. The ground color varies from green, gray, brick red, and brown; the body lacks the conspicuous bumps or swellings common to other bark-mimicking inchworms. Most individuals may be recognized by the diffuse pale patch about the subdorsum of the anterior half of A5; on some caterpillars, this patch extends forward onto A4. Many caterpillars have a brownish midventral spot on A4. The first seven abdominal segments often have a single middorsal or transverse row of spots over the fold that separates adjacent segments. Commonly there is a darkened middorsal spot or line on A4. On A8 the middorsal mark is vague relative to a white subdorsal spot. The venter is usually pale and weakly mottled, almost powdery in appearance. When viewed under magnification, the integument can be seen to include an abundant allotment of glossy granules. The head is mottled, the spots coalescing to form a dark patch to either side of the midline over the vertex; frequently, one or two dark bars run across the front. The paraprocts and hypoproct are short. Mature larva to 3.5 cm in the overwintering (winter) generation; summer generation caterpillars are smaller.

DISTRIBUTION AND ABUNDANCE Deciduous woodlands and forests, parks and yards, and other habitats with trees. Found throughout the East. Connecticut: two generations with mature caterpillars in late May and early June, then again in July and August, very common to abundant. Maryland: a partial third generation with adults flying into October.

COMMON HOSTS Alder, ash, basswood, birch, blueberry, cherry, dogwood, elm, hazelnut, ironwood, maple, oak, poplar, serviceberry, sycamore, willow, and many other trees.

REMARKS If you do much beating you will soon find yourself familiar with this abundant inchworm. The caterpillars may dangle from a thread at night, suspended in midair for hours. This behavior is not understood, although it surely must afford them some protection from predaceous invertebrates, mice, and other animals that glean foliage by night. Early instar caterpillars may be conspicuously banded with white, yellow, or pale green. The overwintering caterpillars that we have found were gray or red and rather twiglike (while several collections of summer brood larvae were greener and marked with spots). Overwintering caterpillars rest with their bodies flattened against bark, exposed, repeatedly freezing and thawing. They are an important food source for insectivorous birds, such as kinglets, that winter in the East (Bernd Heinrich, personal communication).



Small Phigalia (*Phigalia strigataria*)

Although the coloration of this looper is highly variable, most individuals are some mix of yellow and brown. The darkened setal bases are slightly raised, especially over segments A2, A3, and A8; the sides of A2 and A3 bear a raised area behind the spiracle that is often flushed with rust, brown, or black. Usually there is some hint of a broad, pale spiracular stripe that runs down onto the anterior proleg. The dorsum of the body is set with vague, narrow striping; in pale forms there are distinct addorsal, subdorsal, and supraspiracular stripes. The head is brownish with dark spots and occasionally bears pale patches over and to either side of the triangle. Mature larva to 3 cm. The caterpillar of the Toothed Phigalia (*Phigalia denticulata*), which occurs from Connecticut southward, has similar warting. The ground color is dull gray in the single image we have for this species.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Ontario to southern Maine southward to Florida and Texas. Connecticut: one generation with mature caterpillars in May and early June, very common. Maryland: mature caterpillars a month earlier.

COMMON HOSTS Many woody shrubs and trees including blueberry, chestnut, elm, hazelnut, maple, oak, and willow.

REMARKS Phigalians are true winter moths in the South, where they begin flying in January. In New England (or in the mountains elsewhere) the flight is later, lasting into April and May. There is curiously little in the literature about the immature stages and larval hosts of this very common moth. During late May and early June, caterpillars of the Small Phigalia are common in a variety of wooded habitats, sometimes in outbreak numbers. The pupa overwinters.



Spiny Looper (*Phigalia titea*) [The Half-wing]

The body of this dapper gray-blue caterpillar bears numerous black pinstripes. The addorsal stripe, edged with black on either side, is often flushed with orange or tan. Additional orange patches are found about the spiracles. Raised warts include the spiracle on the anterior abdominal segments—these are largest on A2. Each seta is borne from a black pimplelike base. The head is generously peppered with black spots. Mature larva under 3.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Great Lakes Region to Nova Scotia south to Florida and Texas. Connecticut: one generation with mature caterpillars in May and early June, very common. Maryland: mature caterpillars up to a month earlier.

COMMON HOSTS Many woody shrubs and trees including apple, basswood, birch, blueberry, cranberry, elm, hickory, maple, oak, and poplar.

REMARKS Phigalias are single-brooded, new-leaf specialists that are active early in spring. Like many other geometrids with adults that are active during colder parts of the season, the females are flightless. Eggs are deposited in bark crevices and the first instars crawl or balloon to find suitable foliage. Occasionally this species reaches outbreak levels, defoliating local areas of forest. The pupa overwinters in litter or soil.



Spring Cankerworm (*Paleacrita vernata*)

Exceptionally variable, this caterpillar ranges from yellow-green through many shades of brown and black. The body is smooth except for small warts over the dorsum of A8. While most individuals have a pale spiracular stripe, some individuals have additional addorsal, subdorsal, and supraspiracular stripes; look for a green-yellow midventral stripe. Frequently there is a dark middorsal spot along the anterior edge of segments A2, A3, and A4; other dark spots sometimes follow the abdominal spiracles. The most reliable marking is found on the head: look for a dark transverse bar that cuts through the top third of the triangle. A more diffuse bar runs roughly parallel to the first, over each lobe. The 30 to 42 crochets are in a single group. Both the paraprocts and hypoproct are poorly developed. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and yards. Eastern Canada south to Georgia, Mississippi, and eastern Texas. Connecticut: one generation with mature caterpillars in late May and early June, common. Maryland: mature caterpillars earlier.

COMMON HOSTS Apple, birch, cherry, elm, maple, oak, and many other trees.

REMARKS Adults emerge and mate in the very early spring, on nights too cold for the majority of moths. The wingless females lay their eggs in clutches of 100 or more, in bark crevices, well-ahead of bud break. First and second instars disperse by spinning down on silk threads that allow them to be carried about the forest. Females can be located by searching tree trunks during light rains—bark that is not wet may be so because a female is perched immediately above. The caterpillars are new-leaf specialists that complete their development on young spring foliage. Once mature, the caterpillar drops to the ground, tunnels down, and forms an earthen cell in which it will pass the next 10 months. Pupation does not occur until late winter-early spring.



Linden Looper (*Erannis tiliaria*) [Winter Moth]

The contrasting brown dorsum and broad lemon-yellow spiracular stripe immediately distinguish this caterpillar from all others in the East. The dorsum may be marked with as many as 10 black pinstripes. The venter is chalky.

In most individuals the head is pale orange brown and unmarked. Each of the spiracles is ringed in black. Mature larva to 3.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Canada south to Georgia and northeastern Texas. Connecticut and Maryland: one generation with mature caterpillars from April (Maryland only) to early July (Connecticut), generally uncommon except in outbreak years.

COMMON HOSTS Many woody shrubs and trees including apple, ash, basswood, birch, cherry, elm, hawthorn, hazelnut, hickory, maple, oak, poplar, rose, serviceberry, and willow.

REMARKS Caterpillars also go under the name Lime Tree Looper. This is a boom and bust species, present in low numbers in most years but sporadically erupting and causing local defoliation. The Linden Looper is a denizen of cold weather; the caterpillars are active quite early in spring and the adults emerge late in fall, mostly in October in New England, after the first frost. Like many other cold-adapted geometers, the females are wingless. The egg, laid in a bark crevice, overwinters.



Gray Spring Moth (*Lomographa glomeraria*)

This pale- to lime-green looper has a cream or frosty white middorsal stripe that narrows over T1. Below the middorsal stripe are weak subventral, adventral, and midventral stripes (McGuffin 1981). The head is pale green and unmarked, lacking the reddish commalike marks that are present in the other two Spring Moths (*Lomographa*) treated here. The anal plate is broadly rounded; the paraprocts and hypoproct are very short. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Shrubby fields, woodlands, and forests. Eastern Canada south to Florida and Texas. Connecticut and Maryland: one generation with mature caterpillars in June and July, common.

COMMON HOSTS Cherry, hawthorn, and possibly other trees and shrubs in the rose family.

REMARKS The Gray Spring Moth is a new-leaf specialist that completes its larval development quickly, over a 4-week period. The caterpillar rests on a leaf by day, sometimes grasping it in such a way as to resemble a petiole. The pupa overwinters.



Wildcherry Looper (*Lomographa semiclarata*)
[Bluish Spring Moth]



Sea to emerald green, this caterpillar has a yellow middorsal spot at the back edge of T1 and A1 through A7 (occasionally these spots fuse to form a middorsal stripe). In some individuals the spots are edged with scarlet. Usually a red to brown line drops over the edge of the anal plate onto the anal proleg. On the head, note the broad red to brown line running down each side of the triangle. Mature larva under 2.5 cm.

DISTRIBUTION AND ABUNDANCE Shrubby fields, woodlands, and forests. Transcontinental in Canada, south in the East to Georgia (in mountains) and the Ozarks. Connecticut and Maryland: one generation with mature caterpillars in June and July, locally common.

COMMON HOSTS Cherry, chokeberry, hawthorn, mountain ash, ninebark, and other woody plants in the rose family.

REMARKS On the wing this white and gray diurnal moth looks surprisingly similar to a female Spring Azure butterfly (*Celastrina ladon*). The caterpillars of the Wildcherry Looper are active in early spring, with most individuals completing their development on young leaves. Confined females readily oviposit on cherry. The pupa overwinters.



White Spring Moth (*Lomographa vestaliata*)

An ill-defined cream subdorsal stripe and even less distinct supraspiracular stripes run the length of this deep green caterpillar. A thin white to yellow stripe runs through the spiracles. The venter is waxy green.

Each lobe of the head bears a commalike mark that is often infused with red above; the lower black "tail" reaches to the eyes. The spiracles are orange. Mature larva to 2 cm. The Wildcherry Looper (*Lomographa semiclarata*) is more stout and has yellow middorsal spots that may join to form a stripe.



DISTRIBUTION AND ABUNDANCE Shrubby fields, woodlands, and forests. Eastern Canada south to northern Florida, eastern Texas, and Colorado. Connecticut: one principal generation and a partial second generation, with mature caterpillars from July to September, common. Maryland: one principal generation in early summer and two subsequent partial generations, with mature caterpillars from April onwards.

COMMON HOSTS Woody plants in the rose family, such as apple, cherry, hawthorn, mountain ash, and ninebark, but also reported (erroneously?) from hornbeam, maple, snowberry, and viburnum.

REMARKS We encounter caterpillars of the White Spring Moth nearly everywhere we beat apple and cherry. The caterpillar rests stretched out on the underside of a leaf. The pupa overwinters.



Yellow-dusted Cream Moth

(*Cabera erythemaria*)



Both of the *Cabera* treated in this guide are easily recognized by their squarish head, somewhat flattened body, reddened antenna and cheek line, and in most individuals, the middorsal spots at the leading edge of A1 through A7. A subspiracular stripe carries from the antenna to the thoracic segments; over the abdominal segments it is broken into a series of dashes. The prolegs are infused with wine-colored. The Yellow-dusted Cream Moth often sports considerable pink, and more prominent subdorsal striping than the Pink-striped Willow Spanworm (*Cabera variolaria*). Some individuals have pink to either side of the black middorsal spots as well as on the prolegs. Well-marked caterpillars have a broad subspiracular and a narrow, wavy supraspiracular white stripe, and have the middorsal spots on the anterior abdominal segments enclosed by black parentheses. Other individuals are green and almost without markings. Mature larva under 3 cm. Determinations should be based on the adult stage until reliable characters can be identified for these two moths; see the Pink-striped Willow Spanworm below.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, fields, meadows, swamps, and watercourses. Canada south to Georgia (in mountains) and the Ozarks. Connecticut and Maryland: two generations with mature caterpillars from June to mid July, then again in August and September, very common. One generation in northern New England.

COMMON HOSTS Willow, but also reported from aspen and poplar.

REMARKS The Yellow-dusted Cream Moth is one of the most commonly encountered loopers on willow. The caterpillars are readily taken with beating sheets and are easily found at night by flashlight. The pupa overwinters.



Pink-striped Willow Spanworm
(*Cabera variolaria*)



Although the ground color is most often green, brown forms are not uncommon. The caterpillar is very similar to that of the Yellow-dusted Cream Moth (*Cabera erythemaria*), above (both may be marked with pink). In our examples, the subdorsal stripes of the Pink-striped Willow Spanworm are less well-developed and there is reduced black coloration enclosing the middorsal spots. In some individuals the middorsal stripe is wine-colored, obscuring the black spots. Characters mentioned in Forbes (1948) and McGuffin (1981) for the separation of these two *Cabera* do not work for our collections; our diagnoses should also be used with caution—identifications should be based on reared adults. Mature larva under 3 cm.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, wooded swamps, and fields. Transcontinental in Canada south in the East to Georgia (in mountains) and Nebraska. Connecticut: two generations with mature caterpillars in July, then again in September and October, common. One generation northward.

COMMON HOSTS Aspen, poplar, and willow.

REMARKS One of us (Douglas Ferguson) has observed this moth to be more common in the vicinity of poplar than willow, and thus questions the wisdom of calling this species the Pink-striped “Willow” Spanworm. The caterpillar rests by day with the head and body flattened against a leaf—the prolegs are angled backward, enabling the venter to lie closer to the leaf surface. The pupa overwinters.



Barrens Carpet (*Apodrepanulatrix liberaria*)

The best way to identify this green or brown inchworm is to poke it—upon dropping from its perch it will coil up its body. Numerous longitudinal stripes run the length of the stout body. The darkened middorsal stripe is bounded by two thin white addorsal stripes. Most individuals also have wavy white subdorsal, supraspiracular, and spiracular stripes. Hints of the thicker subdorsal and spiracular stripes sometimes carry onto the head, which varies from brown to green. Setal bases may be black. Both the paraprocts and hypoproct are small; the anal plate is rounded. Mature larva to 3.5 cm.



DISTRIBUTION AND ABUNDANCE Open sandy or rocky sites and barrens. Canada south to Georgia and Mississippi. Connecticut: one generation with mature caterpillars in late May and early June, local and rare. Maryland: no records.

COMMON HOSTS New Jersey tea.

REMARKS We have found this caterpillar in May and early June by carefully examining new growth and by beating. In the East, the Barrens Carpet is the only geometrid on New Jersey tea that coils up into a ball when disturbed. The egg overwinters.



Broad-lined Erastria (*Erastria coloraria*)

Except for a wavy ridge running below the spiracles, the brown to charcoal body is smooth. In most individuals the ground color is darker above the subspiracular stripe than below it. The body is marked with pale addorsal, subdorsal, supraspiracular, and subspiracular stripes. The latter continue from the antenna to the base of the anal proleg. Frequently, small orange spots are positioned behind the abdominal spiracles and others are embedded in the subdorsal stripe. Both the paraprocts and hypoproct are reduced. Mature larva to 4.5 cm. The caterpillar of the more southerly Thin-lined Erastria (*Erastria cruentaria*) is probably quite similar; it has been reared on blackberry.



DISTRIBUTION AND ABUNDANCE Barrens and open sandy areas. Colorado and Great Lakes Region east to Massachusetts (formerly), south to Texas and Florida. Connecticut: historic. New York (Albany): two generations with mature caterpillars in June and July, then again from late August to October, local and uncommon. Maryland: both generations mature a month or so earlier.

COMMON HOSTS New Jersey tea.

REMARKS The larva rests stretched out on the underside of a blade usually along the midrib or with the front end free and the head and thorax arched back. The legs are loosely drawn up to the thorax. Presumably the pupa overwinters.



Holly Looper (*Thysanopyga intractata*)
[Black-dotted Ruddy]



A candidate for the least distinguished geometrid in this volume: the ground color ranges from green to brown, and the body is free of any warts or swellings.

In the green form, which we illustrate, the body is somewhat translucent. The tracheal trunk (the internal respiratory tube that connects the spiracles) is visible within many of the abdominal segments. The darkened spiracles are small. In some individuals the thoracic legs may be flushed with pink, although they are usually unpigmented. Except for the darkened eyes, the head is unmarked. Mature larva under 2.5 cm.

DISTRIBUTION AND ABUNDANCE Woodlands, swamps, and yards. Tennessee to Massachusetts south to Florida and Texas, especially common along the coastal plain. Connecticut: if resident, two generations with mature caterpillars in July and August, then again from September into early November, rare. Maryland: at least three generations with caterpillars present through much of summer and fall, common.

COMMON HOSTS Holly, and perhaps only American holly in the Northeast.

REMARKS The caterpillar has a strong grip and can be difficult to dislodge from its host. By day, it often rests on the underside of a leaf. Captures in northern states may represent migrants from the South. May records of adults in Massachusetts suggest that the pupa overwinters (Mark Mello, personal communication); however, Dale Schweitzer's early January record of a larva in New Jersey suggests otherwise, and late fall records of adults in Maryland suggest hibernation as an egg or larva.



Sinuus Lytrosis (*Lytrosis sinuosa*)

The grotesquely warted body of this enormous looper is mottled in browns, white, and black. The dorsum of A1 bears large swellings that join over the midline; warts over A5 are also prominent. Smaller warts occur below the spiracles on A2. A thin, oblique black line extends from the anterior proleg towards the enlarged spiracle on A8. The darkened head may bear a black spot at the top of the triangle. The paraprocts and hypoproct are long. Mature larva to 6 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Missouri to New Jersey south to Florida and Louisiana. Maryland: one generation with mature caterpillars from late April into June, uncommon and local.

COMMON HOSTS Wild hosts are unrecorded; in captivity caterpillars accept oak and boxelder.

REMARKS Remarkably cryptic, this caterpillar is among the most twiglike of the eastern geometrids. Its coloration and texture are much like the shoots of white oaks on which this caterpillar was raised. First instars are extremely active, looping about and dropping from silk lines. Early instar larvae may disperse long distances before they settle and begin to feed. Young larvae skeletonize patches of tissue especially near leaf margins. The caterpillar overwinters as a nearly grown (ante- or penultimate instar) larva.



Common Lytrosis (*Lytrosis unitaria*)

This fantastic twig mimic often has a middorsal black spot at the leading edge of T2 and sometimes T3. A1 is elongate and bears subdorsal swellings that fuse over the dorsum. Short earlike horns, connected by a low shelf, issue from the dorsum of A5. Most individuals may be readily identified by a thin oblique black line that runs across the anterior proleg up towards the dorsum of A8. The paraprocts extend beyond the end of the abdomen. Mature larva to 6 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Illinois to Maine, south to Florida and Missouri. Connecticut and Maryland: one generation with mature caterpillars from late April into June, common.

COMMON HOSTS Especially fond of hawthorn, rose, serviceberry, and other plants in the rose family, but also reported from maple and oak.

REMARKS The larva angles out from a stem at about 30°-40°. Like other twig mimics it has a “belay” line that it attaches to the stem. If tugged, this single strand can be pulled from the caterpillar’s spinneret at a rate of several inches per second. No doubt this line supports the caterpillar’s weight as well as serves as a safety line should the caterpillar drop from its host. The elongate hindleg, enlarged at its base, resembles a persistent stipule when held outward from the body. When pinched, the larva makes no attempt to wriggle or escape but rather contracts, increasing turgor within its body and making itself even more twiglike. It overwinters as a partially grown larva.



Deep Yellow Euchlaena (*Euchlaena amoenaria*)

Euchlaena caterpillars are excellent twig mimics, thickest about the anterior prolegs, often with dark dashes that run forward from the spiracle on the middle abdominal segments (especially segments A4-A6). Obliquely sloping down from the vertex, the flattened face often bears characteristic patterning. The posterior dorsal setae arise from warts or a ridge on A1 and A5; the dorsum of A8 is modestly humped. The paraprocts are conspicuous. More than a dozen *Euchlaenas* occur in the East. Until the larval characters are known in greater detail, identifications are best based on adults. There are usually dark lines running between the spiracles on A3 to A6 of the yellow to brown caterpillar of the Deep Yellow *Euchlaena*. The dorsal warting on A1 and A5 is subdued. A line, pale below and darker above, runs through the prothoracic spiracle to the whitish antenna. The dorsoventrally flattened head is colored much like the body except for a whitish arc that runs between the eyes, passing through the middle of the triangle. Look for a black line just above the crochets on the anterior proleg; there may be a shorter one where the proleg attaches to A6. Mature larva to 4.5 cm.



DISTRIBUTION AND ABUNDANCE Barrens, woodlands, and forests. Wisconsin to Maine south to Florida and Texas. Connecticut: absent. Maryland: two generations with mature caterpillars from April to early June, then again in July and August, very common.

COMMON HOSTS In captivity caterpillars accept birch and black cherry, but larvae should be expected on many other woody plants.

REMARKS All *Euchlaenas* overwinter as half to nearly full grown caterpillars. We are uncertain as to whether the larvae stay on the host or move down into litter. Caterpillars sleeved on hosts tend to fare better over the winter months than those held in containers. They are easily reared to maturity when collected in spring.



Least-marked Euchlaena (*Euchlaena irraria*)

The ground color of this twig mimic may be gray, brown, or red; look for low dorsal transverse ridges on A1 and A5. On other abdominal segments, the dorsal setae arise from minute warts. The head bears a tooth-shaped mark: the “cap” includes the triangle, the “roots” run back to the thorax and join the subdorsal stripe. A dark M-shaped mark sits over the midline, amid the roots. The sides of the thorax and first abdominal segments are often pale. The subdorsal and supraspiracular stripes tend to be dark and in some individuals are incorporated into other markings over the abdomen. Many individuals have a pale spot on the venter of A2 and A3. Mature larva to 4 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Colorado to southeastern Canada to Georgia and Texas. Connecticut and Maryland: one generation with mature caterpillars in May and June, generally uncommon.

COMMON HOSTS Many woody shrubs and trees including birch, dogwood, laurel, maple, meadow-sweet, oak, poplar, sweetfern, and viburnum.

REMARKS Confined females oviposit readily in captivity. When handled, the caterpillars are lethargic and sticklike, shunning quick movement. All *Euchlaenas* rest with the anterior portion of the body elevated. The legs of the last thoracic segment may be held out perpendicular to the body, or drawn against the thorax.



Ochre Euchlaena (*Euchlaena marginaria*)

As in the Deep Yellow Euchlaena (*Euchlaena amoenaria*), there are dark lines running forward from the spiracles on A4 and A5 that may be quite thin and inconspicuous. Often a dark middorsal line is present over the thoracic and first abdominal segments. The minute setal bases are blackened. The dorsal warting on A1 and A5 tends to be pronounced. There is often a dark line on the anterior proleg, near where it attaches to the body (a feature shared by other *Euchlaena*). In our collections, the head tends to be mostly chocolate-, steel- or gray-brown with two faint lateral lines running to the eyes; otherwise the head lacks much of the contrast and range of color common in other members of the genus. Mature larva to 4.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental across southern Canada, south in the East to Florida and Missouri. Connecticut: one generation with mature caterpillars in late May and early June, uncommon. Maryland: one principal generation with caterpillars maturing in the very early spring.

COMMON HOSTS Many woody shrubs and trees including alder, ash, basswood, birch, dogwood, elm, maple, New Jersey tea, persimmon, viburnum, and willow.

REMARKS Although we treat the Ochre Euchlaena as being single-brooded, there may in fact be a second brood that currently is mistakenly recognized in the literature and collections as a second species, i.e., *E. pectinaria* (Richard Heitzman, personal communication). To complicate matters further, it is possible that the southern entity (with two generations, the first resembling *E. marginaria*, and the second going under the name *E. pectinaria*) will prove distinct from the single-brooded northern species.



Obtuse Euchlaena (*Euchlaena obtusaria*)

Udderlike protuberances over A5 distinguish this tan, brown, or red-brown stick mimic. There is a second set of much smaller warts over A1. Look for a dark dorsal midline that runs from T1 or T2 back to the leading edge of the dorsal transverse ridge on A1; behind this ridge, as well as that over A5, the dorsum may be lightened. The head is palest in and about the triangle; an oblique darkened patch runs from the eyes up towards the top of the triangle. Mature larva to 5 cm. Very closely related to (if even distinct from) the Muzaria *Euchlaena* (*Euchlaena muzaria*).



DISTRIBUTION AND ABUNDANCE Forests and woodlands, especially oak barrens northward. Nebraska and Illinois to New Jersey south to Florida and Texas. Reports from southern Canada, Maine, and other northerly states probably refer to the Muzaria *Euchlaena*. Connecticut: absent. Maryland: two generations, with caterpillars maturing in late April and May, then again in July and August, common.

COMMON HOSTS Rose and touch-me-not or impatiens; we have also reared it on birch and black cherry. Presumably eating many woody species.

REMARKS The closely related Muzaria *Euchlaena* has a single generation in New England, with caterpillars maturing in May and June.



Mottled Euchlaena (*Euchlaena tigrinaria*)

Except for more prominent warting and ridging, the caterpillars are much like those of other *Euchlaenas*. The abdominal spiracles may be situated in pale patches, especially on segments A4 to A6. The head has two dark bars running across the face: the more pronounced bar runs from the eyes through the upper portion of the triangle; the second bar extends between the antennae, running over the clypeus. Like other *Euchlaenas*, there is often a dark line in front of the spiracle on A3 to A6 (but especially A4 and A5) and another dark line on the anterior proleg. Mature larva to 4.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Pacific Northwest to Maine south in the East to Georgia and Texas. Connecticut: one generation with mature caterpillars in late May and early June, uncommon. Maryland and Missouri: two generations southward.

COMMON HOSTS Woody shrubs and trees including birch, hazelnut, oak, poplar, serviceberry, willow, even pine, and no doubt, many others.

REMARKS Our image is of the overwintering instar, taken in fall. Mature caterpillars are plumper in aspect. McGuffin's (1981) illustrations suggest that the coloration and patterning on the head will be a promising character system for sorting out the *Euchlaenas*. This would be a great project for anyone who has both a passion for caterpillars and talent for rearing species that overwinter as larvae.



Crocus Geometer (*Xanthotype sospeta*)



Although highly variable in coloration, both of our Crocus Geometers (*Xanthotype*) are basically one of two colors: pale green or brown. In either case, the body is very elongate, the head is squarish when viewed from above, and there is a prominent white spiracular stripe. This stripe is especially pronounced towards the rear of the body; occasionally the upper portion is edged with red or brown, especially rearward. Often there is a small dark middorsal spot at each anterior edge of A2 to A5. The paraprocts are very long, extending well beyond the triangular anal plate. Mature larva to 4.5 cm. Very closely allied to the False Crocus Geometer (*Xanthotype urticaria*); definitive identification usually requires genitalic dissection of the adult.

DISTRIBUTION AND ABUNDANCE Many open and wooded habitats. Manitoba to Nova Scotia south to Florida and Nebraska. Connecticut: Two generations with mature caterpillars in late May and June, then again in July and August, very common.

COMMON HOSTS A general feeder, usually on low growing plants and shrubs. Some of its food plants include basswood, blueberry, cherry, chrysanthemum, currant, dogwood, elm, gladiolus, hickory, maple, meadow rue, meadow-sweet, mint, New Jersey tea, rose, and viburnum.

REMARKS The caterpillar rests on stems in a twiglike fashion, with the body straight and fully extended, the enormous anal prolegs clamped to the host. The anterior of the body is secured to the vegetation by a belay line as in other ennomines. In general the larva is lethargic, and reluctant to move. It often quavers from side to side when disturbed or while moving between perches. When handled, the larva feigns death initially, but, if further molested, will thrash about. *Xanthotype* overwinter as middle to late instar caterpillars.



False Crocus Geometer (*Xanthotype urticaria*)

Perhaps indistinguishable from the Crocus Geometer (*Xanthotype sospeta*) as a larva, the False Crocus Geometer tends to be smaller, with mature caterpillars attaining lengths of only 3.5 to 4 cm. Our preserved material suggests that the hypoproct in the False Crocus Geometer is about the same length as the paraprocts. In the Crocus Geometer, the hypoproct is distinctly shorter than the paraprocts. Two other *Xanthotype* species occur from Maryland southward. Genitalic dissections are necessary for certain identification of eastern *Xanthotype*, especially in the Southeast.



DISTRIBUTION AND ABUNDANCE Fields, woodland edges, and many other habitats. Manitoba to Nova Scotia south to Georgia and Arkansas. Connecticut: two generations with mature caterpillars from May into June, then again in July and August, common.

COMMON HOSTS A general feeder on trees, shrubs, and herbaceous growth including azalea, blueberry, chrysanthemum, currant, dogwood, goldenrod, ground-ivy, rose, spirea, and sweetfern.

REMARKS The first and second generation caterpillars divide themselves among those larvae that will produce a facultative second or third generation adult and those that will overwinter as larvae. These correspond to specific color forms. Green phase caterpillars usually emerge without diapause, whereas brown phase larvae diapause and overwinter. Only infrequently do brown phase caterpillars pupate and produce a same season adult.



Hübner's Pero (*Pero hubneraria*)

This large, elongate inchworm is thickened about the thorax and towards the rear of the body. Its coloration is highly variable: often the yellow to brown ground color is broken by numerous narrow, wavy stripes. A thin darkened middorsal stripe is usually visible, especially towards the rear of the body. The squarish head is somewhat eared, with the face darkened. There are raised warts about the spiracle on A2. More than 20 setae are found on the outer side of the anterior proleg. The anal plate is distinctly squared off at its end; the hypoproct extends beyond the paraprocts. Unlike related genera, the crochets are in one group. Mature larva to 4 cm. Over much of the East, this species co-occurs with Honest Pero (*Pero honestaria*) and Morrison's Pero (*Pero morrisonaria*)—we are unable to distinguish these as larvae.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Southern Canada to northern Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars in June and July, then again from September to early November, common.

COMMON HOSTS Many woody plants including alder, birch, and willow; also reported from conifers, although many of these records may pertain to Morrison's Pero.

REMARKS In the Northeast there are three common, closely related *Pero*. Females are difficult to identify, and identification of males is best based on examination of the genitalia and associated anatomy.



Morrison's Pero (*Pero morrisonaria*)

As noted above, we know of no differences that separate the caterpillars of this species from those of Hübner's Pero (*Pero hubneraria*) and the Honest Pero (*Pero honestaria*). The caterpillar is generally brown and marked with fine striping. Perhaps the most useful discriminator is host choice: Morrison's Pero is usually found feeding on conifers while the other eastern Pero species are thought to prefer deciduous vegetation. Mature larva to 4 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Transcontinental in Canada south in the East to Georgia (in mountains) and upper Midwest. Connecticut and Maryland: two generations with mature caterpillars in June and July, then again in fall, common.

COMMON HOSTS Fir, larch, pine, and spruce; but also reported from birch and other broadleaf shrubs and trees, although these records may represent misidentifications.

REMARKS Peros lay their eggs in rows (McGuffin 1987). The caterpillars are stick mimics that rest with the anterior end elevated, attached by a safety line of silk. The thoracic legs are short and held against the body. All eastern Peros species overwinter as pupae.



Oak Beauty (*Nacophora quernaria*)

A full grown caterpillar of the Oak Beauty is enormous by looper standards. Ground colors vary from gray to brown and green. When viewed under a dissecting scope, the integument sparkles with minute granules.

T2 is raised and shelllike, especially about the subdorsum. Note the subtle ridge that runs over A2 and the large swellings protruding from the subventer of A3. There is a distinctive fringe of hairlike setae running between the anterior and anal prolegs. The top of the head is notched, but not as deeply as that of the Cleft-headed Looper (*Biston betularia*). Each of the primary setae is borne from a pale yellow to greenish wart. The paraprocts and hypoproct are small. Mature larva to 4.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Found throughout the East. Connecticut: one generation with mature caterpillars from August to October, common. Maryland: evidently there is a partial second generation.

COMMON HOSTS Many forest trees and shrubs including ash, basswood, birch, cherry, elm, oak, poplar, and willow.

REMARKS Like other twig mimics the caterpillar can be very lethargic even when harassed. In the typical resting posture, the head is raised and the anterior end of the body, head, legs, and thorax are drawn into a fistlike ball. Occasionally a kink is thrown into the body axis as well. A fringe of subventral abdominal hair is a feature that it shares with other bark-dwelling caterpillars, like the underwings (Family Noctuidae: *Catocala*) and Pale Beauty (*Campaea petlata*), which spend their days resting along branches and boles. The pupa overwinters.



Fringed Looper (*Campaea perlata*)
[Pale Beauty]



The extra set of prolegs on A5 and the fringe of pale hairs that runs along the subventer of the abdomen immediately distinguish this caterpillar. The ground color varies from gray to brick red, or less commonly, smoky green. The head has an oblique dark band that extends from the vertex down to the eye. Mottling on the head tends to be more conspicuous behind this band. Each of the tan spiracles is ringed with black. The venter is noticeably flattened and pale, being green along the midventer and frosty towards the fringe. Mature larva to 4 cm.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, and parks. Transcontinental in Canada south in the East to Georgia (in mountains) and Arkansas. Connecticut: two generations with overwintering caterpillars maturing from May into June, and summer generation caterpillars maturing in July and August, very common. Maryland: first generation caterpillars mature as early as April and second generation caterpillars occur from late June into September.

COMMON HOSTS Many woody shrubs and trees including alder, aspen, birch, cherry, hazelnut, maple, oak, rose, serviceberry, and willow, as well as softwoods such as fir, hemlock, and larch.

REMARKS The setae along the lower sides of the body closely resemble the “shadow elimination hairs” of Underwing (*Catocala*) caterpillars—both genera have setae that are pale and thickened at their bases. Such setae are common among caterpillars that rest on bark. In England, caterpillars of the Light Beauty (*Campaea margaritata*) overwinter on branches and boles, fully exposed to winter conditions (Porter 1997).



Maple Spanworm (*Ennomos magnaria*)

This marvelous green, gray, or brown twig mimic has a large swelling that extends across the dorsum of A2 and another smaller one that spans A5. Segments A2 and A3 each have a low swelling behind the spiracle; the swelling on A3 is subtended by a prominent subventral wart. The dorsum of A8 has comparatively small warts. All of the swellings tend to be darkly colored. Long antennae, often reddened, project well in front of the greenish head. Under a hand lens, numerous minute pale bumps can be seen scattered over the body. The short, thick, conical paraprocts project beyond the anal plate. Mature larva to 6 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Transcontinental in Canada south in the East to Georgia and Missouri. Connecticut: one generation with mature caterpillars from late June to August, common.

COMMON HOSTS Many woody shrubs and trees including alder, ash, aspen, basswood, beech, birch, hickory, holly, maple, oak, poplar, and willow.

REMARKS The Maple Spanworm is a master of deceit. The fall-active adults mimic fallen, yellowed leaves. The caterpillars make quite credible twigs. The first two pairs of legs are held forward, flat against the underside of the body, and the last pair of thoracic legs, greatly swollen at their bases, are held out away from the body. By flashlight, these nocturnal behemoths are readily discovered—look for them feeding near the ends of shoots. The eggs, which overwinter, are laid in a row.



Elm Spanworm (*Ennomos subsignaria*)

The elongate caterpillar comes in a variety of color forms, from yellow-green to brown or nearly black. Pale colors may predominate at low larval densities, and dark colors during outbreaks. Segments A2 and A8 each have a low ridge that connects the bases of two of the dorsal setae; many individuals also possess a ridge over A5. In the pale forms the head is yellow-green; in the dark forms the head varies from brown to red-orange and wine-colored. The antenna is relatively long. Typically, the head color is shared by the legs and anal plate. The paraprocts and hypoproct are well-developed. Mature larva to 4 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Manitoba to Nova Scotia south to Florida and Texas, although absent to rare from much of the coastal plain. Connecticut: one generation with mature caterpillars from late May to early July, common. Maryland: mature caterpillars from late April into July.

COMMON HOSTS Many woody shrubs and trees including apple, ash, basswood, beech, birch, elm, hickory, ironwood, maple, oak, poplar, viburnum, willow, and witch-hazel.

REMARKS Populations of the Elm Spanworm periodically defoliate many acres of broadleaf forest. It also is an occasional pest in yards and parks. The caterpillars eat holes out of the middle of a blade leaving the veins and edges intact. Whereas most loopers and spanworms drop into the litter to pupate, caterpillars of the Elm Spanworm frequently form a cocoon among leaves on the tree upon which they are feeding. The caterpillars consume young foliage, completing their development in late spring and early summer. Females lay the eggs on the undersides of twigs. The eggs overwinter.



The Thin Wing (*Epirranthis substriataria*)



A complex pattern of striping runs the length of this slender, gray to brown caterpillar. The thorax bears a dark middorsal stripe and often a darkened V over T2 and T3. Blackened diamond-shaped spots extend across the top of the abdominal segments. The pale head is densely mottled with dark spots that are arranged in a herringbone pattern over each lobe; a dark arc of spots extends between the eyes, looping over the triangle. The ridge on A8 that connects the anterior dorsal setae is bordered posteriorly by a brown transverse line. The underside is pale with only a faint indication of a midventral stripe on A4 and A5. Mature larva to 3.5 cm.

DISTRIBUTION AND ABUNDANCE Hudsonian and Canadian zone forests. Throughout much of Canada south in the East to New Hampshire and New York. Connecticut: absent. New York: one generation with mature caterpillars in June.

COMMON HOSTS Aspen. McGuffin (1981) also listed willow and several conifers, although his caterpillars fared poorly on willow and he doubted the veracity of the latter.

REMARKS Except for the geometers that overwinter as caterpillars, this is one of the earliest species to mature, with many individuals completing larval development by the first week in June. The caterpillars “snap” their bodies when disturbed, launching themselves from their perch. American authors have placed this genus in its own tribe within the Ennominae, while European authors have placed it in the Oenochrominae. McGuffin (1981) was not convinced that it belonged to either subfamily. The larval snapping behavior, shared with members of the genera *Petrophora*, *Tacparia*, and *Homochlodes*, would suggest the moth is well-placed here, within the Ennominae. The pupa overwinters.



Leaping Looper (*Petrophora subaequaria*)
[Northern *Petrophora*]



Mostly brown above the spiracles and pale below them, this caterpillar has five faint stripes that run through the brown upper portion of the body: one addorsal, two subdorsal, and two supraspiracular stripes. The most prominent feature is the broad white spiracular stripe that runs along the lower edge of the spiracles; rearward this stripe intensifies in color and drops down the outer face of the anal proleg. Above this stripe, the ground color is appreciably darkened. The thoracic coloration continues onto the head as a series of pale brown and dark brown stripes. Mature larva to 3 cm. We are not familiar with the larva of the Common *Petrophora* (*Petrophora divisata*), but suspect that it is rather similar; it also feeds on ferns. The Common *Petrophora* ranges south to Texas.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to at least Maryland and Texas. Connecticut and Maryland: one generation with mature caterpillars in July, uncommon.

COMMON HOSTS Ferns, such as bracken fern.

REMARKS The caterpillar has a remarkable “jumping” ability. It throws itself off its perch by tucking the head down under the abdomen and then violently snapping the head up. Usually the action is repeated, such that the caterpillar springs about, to and fro. The pupa overwinters in leaf litter.



Pale Alder Moth (*Tacparia detersata*)



The body is pale to dark brown, usually with the dorsal area appreciably darkened. Often there is a thin, pale subdorsal stripe that carries from the antenna back along the length of the body. In lighter color forms, the pinstripes that run through the darkened dorsal area spill over the top of the head. The sides of the body are appreciably lighter, except for a darkened supraspiracular "stripe" that is itself bisected by a pale line. The setae are borne from darkened bases. Both the paraprocts and hypoproct are short; the anal plate is roughly triangular. Mature larva under 3 cm. A second member of the genus, *Tacparia atropunctata*, occurs on gale and sweetfern in the Northeast. Gale and sweetfern may be hosts for a third member of the genus, *T. zalissaria*; this moth is an inhabitant of the coastal plain from southern New England to Texas. It is more common from Maryland southward, in areas where wax myrtle (southern bayberry) grows in abundance.

DISTRIBUTION AND ABUNDANCE Swamps and along watercourses; alder forests northward. Eastern Canada south to Maryland, West Virginia, and the Great Lakes Region. Connecticut and Maryland: one generation with mature caterpillars from June to early August, locally common.

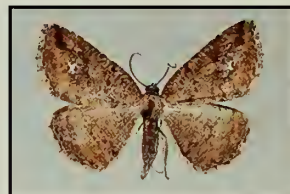
COMMON HOSTS Alder.

REMARKS When alarmed the larva coils and uncoils violently, hurling itself from its perch. It too, like the Northern Petrophora (*Petrophora subaequaria*), has been called the Leaping Looper. Rather than feed along the edges of a leaf, as do most caterpillars, it tends to eat irregular holes out of the middle of a blade. Adults may be easily located during the day by tapping stands of alder in late May and June; adults also come to lights. The female readily oviposits when confined in a container with an alder leaf. The pupa overwinters.



Pale Homochlodes (*Homochlodes fritillaria*)

Constrictions between adjacent segments give the caterpillar a somewhat corrugated appearance. The brown ground color is broken by numerous stripes and a set of dark dorsal chevrons over the abdominal segments. A series of pale stripes runs along the sides of the body, the most conspicuous of which is the subdorsal stripe, which intensifies over the thorax before continuing down over the head. Among the most distinctive features are the enlarged anal prolegs that flare out to either side in a fashion reminiscent of a whale fluke. Mature larva under 2.5 cm. Two other *Homochlodes* occur in the East—all are fern feeders. Until the larval characters are understood, identifications should be based on adults.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Canada south at least to West Virginia and Maryland. Connecticut and Maryland: one principal generation with mature caterpillars in July, then a partial second generation in September and October, common.

COMMON HOSTS Ferns.

REMARKS The snapping behavior mentioned in the three previous species is shared by all *Homochlodes*. This unique behavior evidently represents an ancient trait that has been passed down to an entire group of related inchworms. The pupa overwinters.



Ghostly Fern Moth (*Gueneria similaria*)

No distinctive warts or swellings mark this uncelebrated brown looper; numerous fine stripes run the length of the body. Often the anterior portion of each abdominal segment is narrowed. Relatively long body setae arise from darkened bases. The brown dorsal area is broken by a weak, frosty addorsal stripe. The most prominent markings are the whitish subdorsal and supraspiracular stripes, which continue onto the head as brownish lines. A weak spiracular stripe runs nearly the full length of the abdomen. On the thorax this stripe broadens and is appreciably darkened; it then continues as a brown line along the cheek to the antenna. Both the paraprocts and hypoproct are short. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Canada south to Georgia and Missouri. Connecticut: one generation with mature caterpillars from late June to August, moderately common. Maryland: two generations.

COMMON HOSTS Ferns including hay-scented, lady, New York, and wood fern.

REMARKS Female adults are so similar to those of the Yellow-dusted Cream Moth (*Cabera erythemaria*) that it is sometimes necessary to examine details of the wing venation to ensure proper identification. The markings on the underside of the hindwing provide some help: the Ghostly Fern Moth often has a weak (discal) spot in the center of each wing. This spot is absent in the Yellow-dusted Cream Moth. The males of the two moths are easily separated as males of Yellow-dusted Cream Moth have broader, comblike antennae, while those of the Ghostly Fern Moth are simple, much like those of the female. Our caterpillars did not spin cocoons. The pupa overwinters.



Kent's Geometer (*Selenia kentaria*)

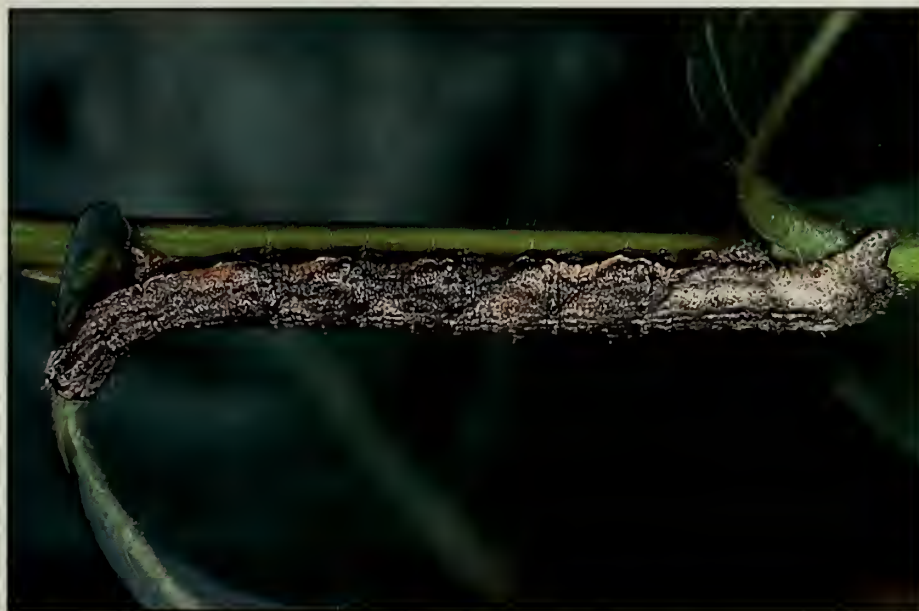


The chunky build of the caterpillar sets it apart from all other inchworms. The circumference of the trunk increases markedly from segments A3 to A4; A5 and A6 are especially thickened. Ground coloration and patterning are highly variable. The flattened head is often streaked with short whitish lines that are continuations of the addorsal and subdorsal stripes. Most individuals have another white line extending back from the eyes. Note also the sparse fringe of subventral setae that runs between the anterior and anal prolegs. Mature larva to 3.5 cm. The Northern *Selenia* (*Selenia alciphearia*) is very similar and may not be separable—Forbes (1948) notes that Northern *Selenia* caterpillars have a pronounced pale patch over A2 and larger warts on the ridges that traverse the dorsum of A4 and A5. Some forms are marked with rust-orange about the legs on T3. Caterpillars have been reared on alder, birch, cherry, currant, hickory, maple, and willow. The Northern *Selenia* occurs south to North Carolina (in mountains).

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to Georgia, Alabama, Mississippi, and Arkansas. Connecticut and Maryland: principal generation with mature caterpillars in June and July, then a partial second generation from August to October, uncommon.

COMMON HOSTS Basswood, beech, birch, elm, maple, oak, and no doubt other woody plants.

REMARKS The caterpillars are exceptional twig mimics with both barklike coloration and texture. We found a *Selenia* caterpillar in the Adirondacks that had what appeared to be foliose lichens growing about its fourth and fifth abdominal segments, but of course, the “lichens” were just a guise, being no more than the insect’s integumental coloration (see cover). When the caterpillar is extended, the third pair of thoracic legs is often held perpendicular to the body. The pupa overwinters.



Dark Metanema (*Metanema determinata*)

The flattened body of this decided bark mimic is variegated in browns, grays, white, and black. The dorsum is marked with a series of pale triangular to spade-shaped marks over A2, A3, and A4—the front edge of each mark extends forward onto the preceding segment. To a lesser extent this pattern is repeated on A5 and A6. Dark bars extend back from the eyes to the subdorsum of T1. The enlarged anal prolegs flare out to either side of the body when the caterpillar is at rest. The paraprocts and hypoproct are short. Mature larva to 2.5 cm. The caterpillars of the more southerly and larger Pale Metanema (*Metanema inatomaria*) often lack much of the brown coloration found in the Dark Metanema (Ives and Wong 1988). Contrary to the larval key in McGuffin (1987), caterpillars of both *Metanemas* may have a black line passing between the eyes. Additional characters are given below.



DISTRIBUTION AND ABUNDANCE Wetlands, marshes, swamps, and edges of watercourses. Transcontinental in Canada, south in the East to western Maryland and Nebraska. Connecticut and Maryland: two generations with mature caterpillars in June and July, then again from August to October, locally common.

COMMON HOSTS Usually willow, but also reported from poplar.

REMARKS The antennae strike us as being proportionately longer than those of many leaf-feeding loopers, perhaps because they are serving as “early warning” tactile sensors, alerting the caterpillar to predators and parasites moving along the shoots. In New England this species is more local than the Pale Metanema (see next page), being confined to wet meadows, swamps, and other wetlands where willows grow in abundance. The pupa overwinters.



Pale Metanema (*Metanema inatomaria*)

Like the Dark Metanema (*Metanema determinata*) on the preceding page, this is a flattened inchworm of robust stature. The ground color tends to have more grays and pale colors. A pale diamond-shape extends over A4 followed by a second wedge of lighter coloration that begins at the back of A5. More subtle wedges occur over A2 and A3. The venter is pale and unmarked. The paraprocts and hypoproct are short. Mature larva to 3 cm. In our collections the prominence of the dorsal patterning is reversed in the two Metanemas: in the Pale Metanema the markings over A4 and A5 dominate the appearance, while in the Dark Metanema the anterior abdominal spade-shaped marks are more pronounced.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, wooded swamps, and edges of watercourses. Much of Canada from British Columbia to Nova Scotia, south in the East to Maryland, Mississippi, and Texas. Connecticut and Maryland: two generations with mature caterpillars in June and July, then again from August to October, locally common.

COMMON HOSTS Usually aspen and poplar, but possibly willow as well; reports from birch, fir, and pine require confirmation.

REMARKS The caterpillar's coloration is well-suited for perching on the bark of aspen and poplar, the primary hosts. We have encountered the caterpillars frequently when beating. It overwinters as a pupa in a cocoon spun in a bark crevice.



Ruddy Metarranthis (*Metarranthis duaria*)

Metarranthis caterpillars tend to be moderately stout, cylindrical, and tan, brown, or reddish with small angulate heads and a humped dorsum on A8. The posterior half of each of the first five or six abdominal segments is traversed by a set of closely spaced creases. Frequently, dark pigment frames the flattened front of the head; the vertex is shallowly cleft. Both the paraprocts and hypoproct are short. The Ruddy Metarranthis is rather undistinguished save for a pale middorsal stripe over the first eight abdominal segments. Frequently it bears a dark patch forward of the third thoracic leg. Mature larva to 3.5 cm. The caterpillars are not readily distinguishable from those of *Metarranthis hypochraria*, *M. indeclinata*, *M. obfirmaria*, *M. refractaria*, and others in the genus. More than a dozen species occur in the East; in addition there may be as yet unnamed species in the Appalachian and Northeastern Regions.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and shrubby fields. Southern Canada to South Carolina, Mississippi, and eastern Texas. Connecticut and Maryland: one generation with mature caterpillars in August and September, common but seldom, if ever, encountered as a caterpillar.

COMMON HOSTS In the laboratory, larvae accept birch, blueberry, and cherry.

REMARKS Despite many hours of beating for caterpillars, we have never knowingly collected a late instar Metarranthis (see remarks for Common Metarranthis, *Metarranthis hypochraria*). Not surprisingly, few wild hosts are known for Metarranthis species. Metarranthis caterpillars develop slowly, with some individuals feeding for more than 14 weeks, but they are remarkably disease free and easily reared. The pupae also survive overwintering with almost no mortality. This is not true for species of the related Proboles, which are difficult to overwinter.



Common Metarranthis
(*Metarranthis hypochraria*)



In our limited experience, this species is more apt to possess a pair of white addorsal spots at the leading edge of A2 than the Ruddy Metarranthis (*Metarranthis duaria*); these same spots may be faintly expressed on the segments that follow. But as noted above, we are unaware of any characters that would reliably separate the Ruddy or Common Metarranthis from other members of the genus. We include it here primarily to show some of the variety displayed by *Metarranthis* caterpillars and discuss the peculiar habits of the larvae. Mature larva to 3.5 cm.

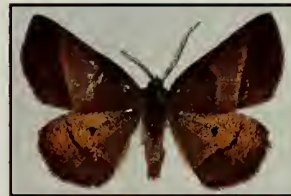
DISTRIBUTION AND ABUNDANCE Brushy woodlands, forests, and shrubby fields. Eastern Canada south to Georgia, Mississippi, and Texas (but see below). Connecticut and Maryland: one generation with mature caterpillars in August and September, common but seldom, if ever, encountered as a mature caterpillar.

COMMON HOSTS In the laboratory, larvae accept apple, blueberry, cherry, and meadow-sweet.

REMARKS In many ways mature caterpillars resemble cutworms (Family Noctuidae): the body is plump, cylindrical, and the coloration subdued. They are lethargic and feign death when handled. The caterpillars are also unusual among geometrids in that they do not routinely use silk, except when spinning their cocoons. We wonder if late instar larvae descend from the leaves onto the bole or move into leaf litter by day, where both their morphology and behavior would seem to be well-suited. The Common Metarranthis may prove to be a complex of two or more species—the range we give applies to the entire assemblage.



Yellow-washed Metarranthis
(*Metarranthis obfirmaria*)



The Yellow-washed Metarranthis tends to be a bit chunkier with the hump on A8 less pronounced than that of many of the other Metarranthis. Additionally, the head seems to be a slightly more rounded. A pale wavy wrinkle runs just under the spiracles; the ground color below this flange is paler than that over the dorsum. But because of the limited nature of our experience with Metarranthis, none of these characters may prove reliable. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Bogs, barrens, and heathy wetlands, but also flying in nearby woodlands and forests. Eastern Canada south to Florida and Texas. Connecticut and Maryland: one generation with mature caterpillars from July into September, locally common.

COMMON HOSTS Bearberry and blueberry; caterpillars hatched from eggs can be reared on cherry and meadow-sweet.

REMARKS Adults of the Yellow-washed Metarranthis are commonly seen flying on warm spring days. However, they do not stop to drink nectar, so prepare yourself for a good chase. A less sporting alternative is to wait for females to visit a light, as they are nocturnal as well. The pupa overwinters.



Scallop Moth (*Cepphis armataria*)

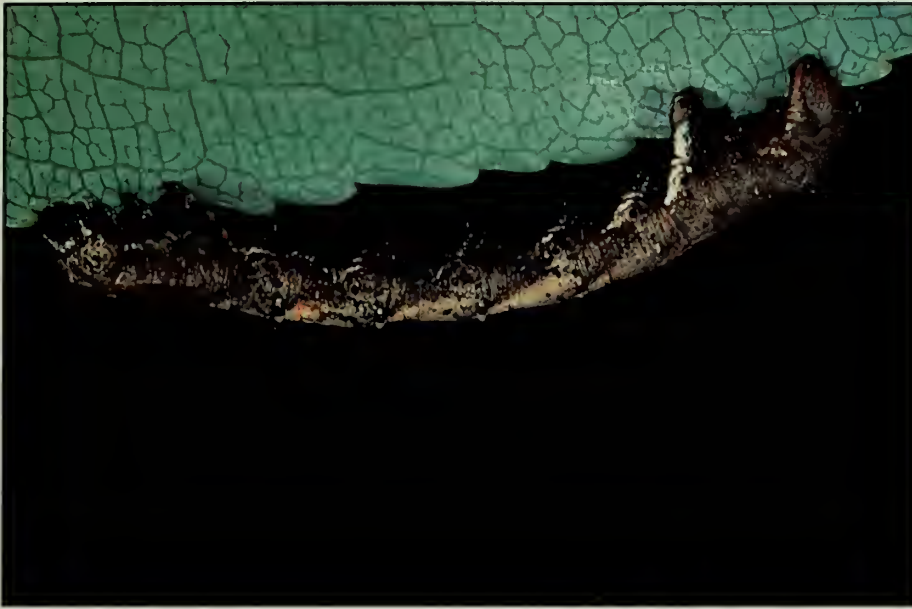


Both members of the genus *Cepphis* may be immediately recognized by the dorsal and lateral swellings of the anterior abdominal segments. These are largest on A2 and A3, so large that the spiracles are displaced upwards on both segments. A8 is topped with a pair of short, thornlike swellings that are connected by a low ridge. In our examples there is a yellow wedge before the spiracles on A4 to A6. A white line runs along the side of the thorax, immediately below the spiracle. The spiracles of A8 are situated on raised warts. The head is small, less than one quarter of the thickness of the broadest abdominal segments. The paraprocts are short, and do not extend beyond the anal plate. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Southern Canada from Manitoba to Nova Scotia south in the East to Georgia and the Ozarks. Connecticut and Maryland: evidently one principal generation—and occasional second generation individuals—with mature caterpillars from July into October, uncommon.

COMMON HOSTS Apple, birch, currant, holly, maple, oak, sweetfern, and many other hardwoods.

REMARKS The larva rocks from side to side when moving or disturbed—the effect is much like that of a dead leaf shaking in a breeze. In the Great Smoky Mountains we observed two rather conspicuously patterned larvae, feeding side by side on obviously damaged leaves. Some silk was also evident. In other moths such conspicuous coloration, damage, and behavior are apt only to occur in distasteful species. The pupa overwinters in *Cepphis*.



Slaty Scallop (*Cepphis decoloraria*)

The most prominent features on this inchworm are the low swellings along the sides of the first six abdominal segments and the angular hump over A8. The dorsal setae arise from pimplelike swellings on the anterior abdominal segments. In some individuals, an oblique subventral line extends forward from below the spiracle; these lines are strongest on A6 and fade away towards the front of the body. A pale line often runs up the outer side of the anal proleg. Lightened triangular patches may be evident over A2 to A5. The brown spiracles are ringed with black. Both the paraprocts and hypoproct are small. Mature larva under 3 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Manitoba to Nova Scotia south to Georgia and the Ozarks. Connecticut and Maryland: evidently one full and a partial second generation with mature caterpillars from July into October, uncommon.

COMMON HOSTS Birch, blackberry, cherry, and probably other hardwoods.

REMARKS The pupa overwinters.



American Barred Umber (*Anagoga occiduaria*)

The caterpillar is brown or red-brown with a small swelling over A5, but otherwise it is rather undistinguished. The body narrows from back to front. Frequently there are subtle corrugations about the spiracles of the anterior abdominal segments. The subdorsal setae are borne on minute pimplelike swellings that are sometimes whitened. Like *Metarranthis* caterpillars, the front of the head is flattened with low earlike lobes. The paraprocts and hypoproct are well-developed, and the anal plate is rounded. Mature larva to 3.5 cm.



DISTRIBUTION AND ABUNDANCE Barrens, woodlands, forests, and wetlands. Transcontinental in Canada south in the East to Georgia, Alabama, and South Dakota. Connecticut and Maryland: two generations with mature caterpillars from June to July, then again from August to October, moderately common.

COMMON HOSTS Many softwoods and hardwoods including alder, birch, cherry, fir, gale, hemlock, rose, spruce, and willow.

REMARKS Light-trapped females readily oviposit, especially if confined with a leaf of a suitable host. The larva is a stick mimic that rests with the anterior end of the body elevated and the thoracic legs held tight against the venter. The pupa overwinters.



Alien Probosc (*Probole alienaria*)



Their variable coloration and lack of characteristic warring makes Proboscles challenging inchworms to identify. The caterpillar has a low, rounded, subdorsal swelling over A5 that in many individuals is flushed with red or brown. The head is usually marked with a broad red to charcoal cheek stripe that extends from the antenna to the subdorsum of T1. The body is somewhat thickened about the thorax, as well as A5 and A6. Coloration in all Proboscles is exceptionally variable, ranging from green and brick red to tan and brown. Usually the middorsal stripe is red, gray, or paler than the adjacent ground color; other stripes are represented as vague runs of pale flecks or spots. Some individuals have a white subventral spot in front of the spiracle. The paraprocts and hypoproct are of average length. Mature larva under 3.5 cm. The caterpillars may be indistinguishable from those of other Proboscles—see the Red-checked Looper (*Probole amicaria*) and Heath Probosc (*Probole nepiasaria*).

DISTRIBUTION AND ABUNDANCE Wetlands, mesic woodlands, and forests. Transcontinental in Canada south in the East to Georgia, Arkansas, and Kansas. Connecticut and Maryland: two generations with mature caterpillars in June and July, then again from August to early October, very common.

COMMON HOSTS Many hardwoods including basswood, birch, black gum, dogwood, hawthorn, maple, sour-gum, and witch-hazel. Additional hosts listed below for the Red-checked Probosc should also be suitable.

REMARKS McGuffin (1987) considered *P. alienaria* to be a form of the Red-checked Looper. We frequently encounter Probosc caterpillars while beating, yet usually fail to recognize them as such until the adults emerge. The pupa overwinters in all Proboscles.



Red-cheeked Looper (*Probole amicaria*)
[Friendly Probole]



Ives and Wong (1988) suggest that the head of the red-cheeked looper tends to be more darkly pigmented than that of the Alien Probole (*Probole alienaria*), although this feature does not hold for all collections. We offer this image primarily to show variability in the genus, as we are unaware of any characters that will differentiate the caterpillars of these two Probolines.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, shrubby fields, and wetlands. Oregon to Maine south to Florida and Texas. In Connecticut and Maryland: two generations with mature caterpillars from late May or June through August, then again from August to November, local and uncommon. Widespread and common southward.

COMMON HOSTS The primary host appears to be dogwood, especially flowering dogwood. Also reported from a variety of other hardwoods and softwoods including alder, basswood, beech, birch, elm, fir, hawthorn, hazelnut, ironwood, larch, maple, poplar, serviceberry, spruce, and willow, but these records may be based on misidentifications.

REMARKS The Dogwood Proboline (*Probole nyssaria*), once believed to represent a distinct species, is merely the spring generation form of this moth. Certain identification of Proboline species may require samples of several associated adults for comparison with accurately determined material—save voucher material, as the taxonomy of the genus is unsettled.



Heath Probole (*Probole nepiasaria*)

The body is smooth except for the low subdorsal swelling over A5. We have reared but a single cohort: all had a greenish ground color; a broad, sometimes broken, reddish middorsal stripe; dark spots below the setae; and only weakly differentiated bands on the head. Given the variability of *Probole* caterpillars, we are doubtful that these characters will hold for other collections. Mature larva under 3.5 cm. Adults are easily identified.



DISTRIBUTION AND ABUNDANCE Barrens, bogs, heathlands, and wetlands. Canada south to Georgia and Kentucky (in mountains). Connecticut: evidently just a single generation with mature caterpillars in June and July, locally common.

COMMON HOSTS Heaths including azalea and laurel, and also dogwood (bunchberry).

REMARKS All *Probole* caterpillars rest with the body fully extended along a leaf or twig. The long antennae project forward from the somewhat flattened head.



Birch Looper (*Plagodis alcoolaria*)
[Hollow-spotted Plagodis]



Last instar *Plagodis* caterpillars usually can be recognized by their humped second thoracic segment and the pronounced swellings over A5. The caterpillars, mostly green and unmodified initially, add color and bulges in later instars. Our accounts are based on limited material (e.g., a single cohort of caterpillars from just one of the two annual generations) and literature that is sparse. Identifications should be confirmed through rearing. Consult Rupert (1949) for additional information on the taxonomy and natural history of the genus. The pupa overwinters in all species of *Plagodis*. The raised areas over T2 and A5 of the Birch looper are mottled with pale and dark marks that contrast with the pale green, tan, or brown ground color. Often the dorsum is tinted with red. The spiracles, each orange and ringed with black, may be embedded in a lightened patch. In many individuals, a pale area on T1 extends onto the head. The midventral stripe is broken into a series of lines. The hypoproct extends beyond the anal plate. Mature larva to 3.5 cm. Rupert (1949) noted that the larva was quite similar to that of the Straight-lined Plagodis (*Plagodis phlogosaria*).

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Southern Canada to Georgia and Texas. Connecticut and Maryland: two generations with mature caterpillars from late June into early July, then again from late August into October, common.

COMMON HOSTS Many woody shrubs and trees including alder, basswood, birch, chestnut, maple, oak, poplar, and willow.

REMARKS Initially, the caterpillars of *Plagodis* are pale green and unwarmed, making them well-suited to remain on leaves by day. Brown last instar caterpillars are convincing twig mimics. They may be beaten from foliage, shrubs, and trees, although usually in low numbers. Confined females readily lay eggs.



Fervid Plagodis (*Plagodis fervidaria*)

The red to brown body has large swellings over T2 and A5. Each dorsal seta may arise from a blackened spot. Additional black spots are often present in the subdorsal area of the thoracic segments and above the spiracles over the abdomen. The dorsum of A8 is but slightly humped. Herringbone marks run over each side of the head. Mature larva to 3.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Minnesota to Maine south to Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars from late May into July, then again from late August into October, uncommon.

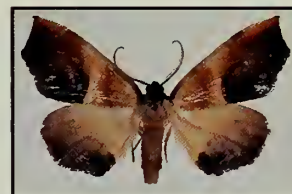
COMMON HOSTS Many woody shrubs and trees including ash, birch, maple, oak, and spruce.

REMARKS The last instar rests on twigs by day with the anterior end of the body elevated and all three sets of legs held tightly against the thorax. Like many other twig mimics, it attaches a silk belay line to the twig upon which it is perched.



Purple Plagodis (*Plagodis kuetzingi*)

In our collections the ground color is mostly brown with an abundance of vague rust, gray, black, and pale markings; T2 is but modestly enlarged. As in the Lemon Plagodis (*Plagodis serinaria*), the anterior face of the abdominal swelling is crossed by a tannish band. Some individuals have dark vertical bars running through the spiracles on A6, A7, and A8. The head is strongly mottled with a dark network of spots. Mature larva to 3.5 cm. Rupert (1949) likened the larva to that of the Lemon Plagodis, but in our material the Lemon Plagodis is distinct: it is more variegated and has a pale band extending across A1.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Southern Canada to Georgia, Alabama, and Illinois. Connecticut: one principal generation with mature caterpillars in July and August, uncommon to rare. Illinois and Ohio: at least a partial second brood.

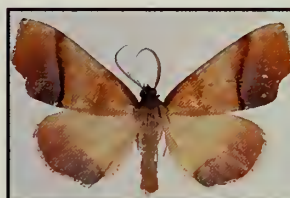
COMMON HOSTS Ash.

REMARKS The warts and posture combine to make the Purple Plagodis one of the best, if not most interesting, stick mimics. At rest A2 is thrown into an upward kink; abdominal segments fore and aft are directed downward.



Straight-lined Plagodis (*Plagodis phlogosaria*)

This is the least distinguished caterpillar of the five *Plagodis* species in the East. The ground color tends to be more uniformly brown or gray and often lacks the white patches of other species. Moreover, the humps of the thorax and abdomen are frequently less pronounced. The swelling over the subdorsum of A5 is crossed by a dark bar, but lacks sharply contrasting adjacent markings (see Lemon Plagodis, *Plagodis serinaria* below). There are weak, interrupted addorsal, subdorsal, and supraspiracular stripes. The dorsal setal bases are often black. Mature larva to 3.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to Georgia and Kansas. Connecticut and Maryland: two generations with mature caterpillars in June and July, then again from late August into October, uncommon.

COMMON HOSTS Many hardwoods including alder, apple, basswood, birch, cherry, hazelnut, oak, poplar, and willow.

REMARKS McGuffin (1987) reared the Straight-lined Plagodis on three occasions. Evidently the coloration differences between the spring and summer forms of the caterpillars are modest relative to those between the adults of the two generations. The first three instars are greenish and lack appreciable warting; the last two instars are brown with the characteristic swellings over the thorax and abdomen.



Lemon Plagodis (*Plagodis serinaria*)

This excellent twig mimic often possesses a subtle white ring that runs over A1. The ground color, typically a smoky brick red, is marked with white, gray, and black. The most conspicuous feature is the rounded subdorsal hump on A5, which is sometimes splashed with black on the anterior side. The ventral setae are borne from small dark warts. Along the front edge of T2 there may be a transverse pale line that is edged posteriorly with black. On the anterior abdominal segments look for a low, darkened, oblique ridge that occurs in front of the spiracle and a white patch rearward of the spiracle. The lobes of the head are heavily mottled. Mature larva to 3.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Southern Canada to Georgia and Alabama (in mountains) and the Ozarks. Connecticut: one generation with mature caterpillars from late June to August, uncommon.

COMMON HOSTS Many hardwoods including basswood, beech, birch, maple, oak, and poplar.

REMARKS We have encountered this larva only once, while beating birch. Eggs are easily obtained by confining females with a host plant. Females deposit eggs in clusters (Rupert 1949); in some *Plagodis* the eggs are laid one atop the other, forming short stacks on the undersides of host leaves (Forbes 1948).



Brown Pine Looper (*Caripeta angustiorata*)

Caripeta larvae are elongate, strongly corrugated caterpillars that lack distinctive warting. Low ridges run between the posterior pair of dorsal setae, and a prominent subspiracular crease extends along the length of the body. The anal plate is distinctly squared off. All three species treated here are variable in coloration and difficult to characterize. Typically the Brown Pine Looper is rusty brown with only subtle patterning, but some individuals are more orange with broad pale green dorsal and lateral areas. Our collections show a smoky or reddish brown supraspiracular stripe running just under the dorsal transverse ridges. The pale patches over the dorsum, when present, are less diamond-shaped than those of the Gray Spruce Looper (*Caripeta divisata*), the anterior half being open and ill defined. Mature larva to 3.5 cm. Until reliable species characters are identified for *Caripeta* caterpillars, we recommend that identifications be based on reared adults.



DISTRIBUTION AND ABUNDANCE Forests. Transcontinental in Canada south in the East to the Carolinas (in mountains) and Nebraska. Connecticut and Maryland: one generation with mature caterpillars from August into November, locally uncommon.

COMMON HOSTS Principally pine, although reported from a wide range of other conifers including fir, hemlock, larch, and spruce.

REMARKS The records in Prentice (1963) suggest that pine is strongly preferred over other conifers in Canada. The older caterpillars feed by folding back a needle tip and chewing it down towards the base. They rest stretched out along a needle. The pupa overwinters in all *Caripeta*.



Gray Spruce Looper (*Caripeta divisata*)

The ground color varies from gray to brown and burnt red-brown. Pale areas may be gray to yellow or yellow-green. Many forms have light patches that run forward from the spiracles on the anterior abdominal segments. Rarely these patches join to form a broad, irregular spiracular band. The upper side of the patches may be edged with a short black oblique line whose lower end runs to the spiracle. Well-marked individuals have pale diamonds over the dorsum of the anterior abdominal segments. Mature larva to 3.5 cm. In our collections, the warting and other texturing of the Gray Spruce Looper is more subdued than that of the other two *Caripeta*. Host association can be a helpful indicator of species identity (see Remarks below). Nevertheless, we recommend that all *Caripeta* caterpillars be reared if a positive identification is required.



DISTRIBUTION AND ABUNDANCE Coniferous forests. Transcontinental in Canada south in the East to Georgia (in mountains). Connecticut and Maryland: one generation with mature caterpillars from August to November, moderately common.

COMMON HOSTS A wide range of conifers including fir, hemlock, larch, northern white cedar, pine, and spruce.

REMARKS According to the host records in Prentice (1963), *Caripeta* caterpillars found on hemlock, spruce, fir, and larch have a high probability of being this species. The Brown Pine (*Caripeta angustiorata*) and Northern Pine Loopers (*Caripeta piniata*), as their names imply, are found more often on pine.



Northern Pine Looper (*Caripeta piniata*)



The Northern Pine or Common Pine Looper caterpillar is gray to orange- or red-brown, with a corrugated texture, not unlike that of a conifer twig that has lost its needles. An oblique pale patch, edged above with black, may be present in front of the spiracle on the first six abdominal segments. Mature larva to 3.5 cm. The Brown Pine Looper (*Caripeta angustiorata*) is similar. In our limited experience, it has more pronounced ridging and is more apt to have pale yellow-green markings along the dorsum or sides. We have seen only the form with a yellow-green spiracular stripe in the Brown Pine Looper. Another pine feeder, the Large Purplish Gray (*Iridopsis vellivolata*) also occurs in a reddish form, but it lacks the transverse ridging. Additionally, in *Caripeta* the crochets are arranged in two groups, whereas those of the Large Purplish Gray are arranged in a single group.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, barrens, and plantations with pine. Canada south to New Jersey and Wisconsin. Connecticut: one generation with mature caterpillars from September to November, common. New Jersey and Cape Cod: two generations, with first being only partial at least in New Jersey (Dale Schweitzer, personal communication).

COMMON HOSTS Pine; reports from spruce seem improbable.

REMARKS *Caripeta* are among the most commonly encountered caterpillars on pine in fall. At rest, all three pairs of legs are held against the underside of the thorax. In New England, the Brown Pine Looper is a denizen of Canadian zone forests. The Northern Pine Looper is more widespread, being found throughout the Northeast, but is the only member of the genus to inhabit the pine woodlands of the coastal plain.



Straw Besma (*Besma endropiaria*)

Like many of the maple twigs it mimics, this caterpillar is mostly green with flushes of red. Knotlike swellings occur subdorsally on T2, laterally on A3, and again over the subdorsum of A3. Paired dorsal warts are pronounced over A6; smaller warts are sometimes present on A5 and other anterior abdominal segments. The sides of the head are heavily pigmented with red, whereas the area to either side of the triangle is often pale. Mature larva to 4 cm. Close to the Oak Besma (*Besma quercivoraria*) below, but often on maple and with a single generation.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Eastern Canada south to Georgia (in mountains) and Arkansas. Connecticut and Maryland: one generation with mature caterpillars from July to September, common.

COMMON HOSTS Often on maple, but also alder, birch, and oak.

REMARKS Eggs are laid on the undersides of leaves. The caterpillars pass through five or six instars before they mature in late summer. The pupa overwinters.



Oak Besma (*Besma quercivoraria*)



At least in the last instar, the caterpillar is an excellent twig mimic with a generous complement of budlike swellings. Both T2 and T3 are enlarged: T2 is especially enlarged about the subdorsal region and T3 where the legs attach. The largest abdominal warts are the subdorsal and lateral swellings on A3. A smaller set of knobs occurs laterally and subventrally on A2. The paired dorsal warts on A1, A5, A6, and A8 are variously developed. All of the swellings are usually reddened, blackened, or both. Each bulbous lobe of the head is darkly pigmented, sometimes with a strong black bar. Mature larva to 4 cm. The Straw Besma (*Besma endropiaria*) typically has a more pronounced reddish cast and the warts are proportionately smaller. The head tends to be red and green in the Straw Besma and brown and black in the Oak Besma.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars from late May into July, then again from September into November, very common.

COMMON HOSTS Many forest trees including alder, beech, birch, elm, maple, oak, and willow; evidently some conifers as well.

REMARKS The Oak Besma amply demonstrates the difficulty in characterizing geometrid caterpillars of different ages. Young caterpillars are green and without appreciable warting. In older caterpillars, the warts and swellings become more developed and the coloration includes more reds and browns. The pupa overwinters.



Spring Hemlock Looper (*Lambdina athasaria*)



Although recognizing *Lambdina* caterpillars is straightforward, assigning species names is another matter altogether, as the taxonomy of the group is far from understood. Lepidopterists are unclear which, if any, of the host plant associations (e.g., conifer- versus broadleaf-feeding populations) represent different biological entities. Additional uncertainty surrounds the importance of whether a population is single-brooded or double-brooded. The Spring Hemlock Looper is boldly marked in white, gray, and black; frequently brown and rust colors are interwoven, especially along the sides of the body. A whitish subdorsal stripe, edged below with black, separates a lighter dorsal area from a more strongly pigmented lateral area. Often pale wedges extend down towards the spiracles. Sometimes there is an orange flush about the spots in the subdorsal and subspiracular stripes, thoracic legs, and abdominal prolegs. With the exception of a transverse wart over A8, there are no other swellings on the body. The head, always strongly patterned, has two pairs of nearly circular black spots on either side of the midline. The hypoproct is long and extends well beyond the paraprocts. Mature larva to 3.5 cm.

DISTRIBUTION AND ABUNDANCE Forests. Canada to at least southern New England. Connecticut: one generation with mature caterpillars from late July into early September, common.

COMMON HOSTS Hemlock, birch, chestnut, hickory, maple, oak, and many other trees and shrubs.

REMARKS Caterpillars of the Spring Hemlock Looper occasionally defoliate large stands of hemlock. Over much of the East, caterpillars of the Hemlock Looper (*Lambdina fiscellaria*) and Spring Hemlock Looper may be found feeding alongside one another. The two are most readily distinguished by size, as the Hemlock Looper is usually two instars (or four weeks) ahead of the Spring Hemlock Looper, and finishes its development in July or August. Adults of the Hemlock Looper fly in fall, and the egg overwinters. Adults of the Spring Hemlock Looper are on the wing in spring, at about the time of bud break; the caterpillars continue feeding well into August and September; and the pupa overwinters. The Curve-lined Looper (*Lambdina fervidaria*) as figured in Covell (1984) is quite closely related to the Spring Hemlock Looper, and may even be conspecific.



Hemlock Looper (*Lambdina fiscellaria*)



The Hemlock Looper or Spanworm is marked like the Spring Hemlock Looper (*Lambdina athasaria*), but often has a greener or paler aspect. The browns commonly seen in the lateral areas of the Spring Hemlock Looper are usually subdued or absent in the Hemlock Looper. Ives and Wong (1988) figure two color forms of the Hemlock Looper, one of which, although quite dark, has little brown coloration. As in other *Lambdina*, a mostly white subdorsal stripe runs the length of the body; immediately below this stripe, elongate black spots form a second broken stripe. The legs, and sometimes other portions of the body, may be tinted with brown, yellow, or orange. The setae arise from blackened spots, which are reduced in size over the thoracic segments. Mature larva to 3.5 cm. Grehan et al. (1994) were unable to find any consistent features that distinguished caterpillars of the Hemlock Looper from those of the Spring Hemlock Looper. Yet, adults of the two moths are immediately distinguishable. Another entity of questionable validity is *L. turbataria*. Adults look very similar to those of the Hemlock Looper but are larger. They fly together in fall, but the two are thought to have different host preferences because *L. turbataria* may be collected where hemlock is absent. The two moths, if in fact distinct, co-occur with the Hemlock Looper throughout much of the northern Appalachians and New England (but not in eastern Canada, where the Hemlock Looper is often abundant).

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to Georgia and Texas. Connecticut and Maryland: one generation with mature caterpillars from July to early September, common.

COMMON HOSTS Many conifers such as fir, hemlock, and spruce, but also apple, birch, cherry, chestnut, cranberry, currant, elm, maple, oak, and many other hardwoods and softwoods.

REMARKS This species occasionally reaches outbreak densities in the northern part of its range, especially in older and over-mature stands of balsam fir and hemlock. The caterpillars hatch in the spring and feed exclusively on new growth for the first two instars. Later instars eat mature foliage. The caterpillars rest on the undersides of branches or intercalate themselves among the needles. The egg, laid on bark, overwinters. Also see remarks under the Spring Hemlock Looper (*Lambdina athasaria*).



Eastern Pine Looper (*Lambdina pellucidaria*)
[Yellow-headed Looper Moth]



This is an attractive caterpillar variegated with narrow stripes of brown, orange, black, and white. Often there is a whitish subdorsal stripe that is bordered along its lower side by a nearly black stripe. The dorsal and ventral areas are decidedly lighter than the average shade of the lateral coloration. The head is conspicuously marked with black spots to either side of the midline. Both the thoracic and abdominal legs may be tinted with orange. Mature larva to 3.5 cm. As noted previously, *Lambdina* is badly in need of monographic study. Most perplexing are recent sex pheromone and mitochondrial DNA studies that suggest that two of the most distinct and easily identified species, the Spring Hemlock Looper and the Eastern Pine Looper, are closely related, if not conspecific.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, and barrens. Southern Maine to northern Florida and Texas. Connecticut and Maryland: one generation with mature caterpillars from August to October, very common.

COMMON HOSTS Hard pines, such as loblolly, pitch, shortleaf, and Virginia pine.

REMARKS In the New Jersey pine barrens, early instar caterpillars occur by the hundreds in May and June on a wide variety of conifers and broadleaf species. The young larvae, conspicuously banded with red, are seen looping over every imaginable plant surface. At night we noted hundreds dangling from short strands of silk. By mid June most caterpillars settle on pine. The Eastern Pine Looper is one of the slowest growing loopers—the eggs hatch in May or June, but it may be September or even October before the caterpillars reach maturity. The pupa overwinters in duff.



Chain-dotted Geometer (*Cingilia catenaria*)

The beautiful bright yellow inchworm is boldly marked with thin black stripes, and black and white spots. Each spiracle is embedded in a white spot that is bordered in front and behind by black. Both the dorsum and venter have three pairs of thin black stripes. A broad yellow stripe runs just under the spiracles. The yellow head and prolegs are prominently spotted with black. Mature larva to 4.5 cm.



DISTRIBUTION AND ABUNDANCE Woodlands, barrens, bogs, and heathlands. Southern Canada to Maryland, Ohio, and Kansas. Connecticut: one generation with mature caterpillars in July and August, rare. Elsewhere, especially northward, locally abundant to the point of being a pest in some years, yet becoming increasingly rare over much of its former range in the Northeast.

COMMON HOSTS Many trees and shrubs including alder, bayberry, birch, blueberry, bog laurel, cranberry, gale, huckleberry, leather-leaf, maple, oak, poplar, sweetfern, and willow; conifer hosts include fir, larch, northern white cedar, and pine.

REMARKS In the Northeast, the Chain-dotted Geometer is most apt to be found in heathy bogs and, along Cape Cod and the offshore islands, in huckleberry dominated heathlands. On Martha's Vineyard and Nantucket, populations often reach high densities following burns. In 1980, Tim McCabe saw the moth in such abundance that an Adirondack bog looked as though it were covered with snow. The colorful black, white, and yellow pupa is visible through the netlike weave of the cocoon. Although *Cingilia* caterpillars and pupae apparently are distasteful, their defensive chemistry has yet to be examined. The egg overwinters.



False Hemlock Looper (*Nepytia canosaria*)

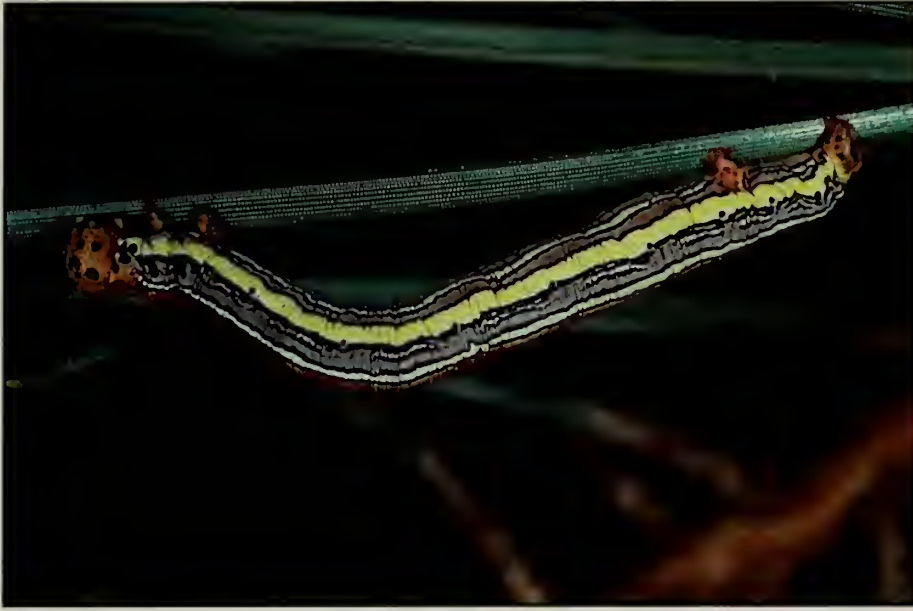


The broad, yellow lateral stripe and the black spotting on the head and prolegs allow immediate identification of this looper. The ground color varies from green to yellow. There is a faint middorsal stripe, a cream subdorsal stripe bounded on either side with brown or black, and wavy black pinstripes running above the spiracles. The venter bears a yellow midventral stripe and three pairs of black pinstripes. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Forests. Eastern Canada south to North Carolina, Kentucky, and Minnesota. Connecticut and Maryland: one generation with mature caterpillars from June through September, common.

COMMON HOSTS Fir, hemlock, larch, northern white cedar, and spruce; also reported from pine.

REMARKS The False Hemlock Looper is a classic looper by design, with abdominal segments seven through ten being considerably shortened and both pairs of prolegs closely situated. More than 70% of the body length can be thrown into a loop when the caterpillar moves to a new resting or feeding site. When viewed from above, the hind end of the body looks much like the head, being mostly green with black spotting. Pupation occurs in a flimsy cocoon on foliage. Both caterpillars and pupae are easily collected by beating. The eggs, truncated at one end, are laid in small clusters and overwinter.



Festive Pine Looper (*Nepytia* species near *pellucidaria*)



A candidate for the East's most flamboyant inchworm, this caterpillar is immediately recognizable by its unusual combination of orange, yellow, lavender, black, and white stripes, the most obvious of which are the broad rusty orange middorsal and lemon yellow spiracular stripes. The white subdorsal stripe is subtended by a series of black and lavender stripes. The head, prothoracic shield, and legs are rusty orange with black spotting. Mature larva to 3 cm. The Pine Conelet Looper (*Nepytia semiclusaria*), found from North Carolina south throughout the coastal plain, is similarly patterned.

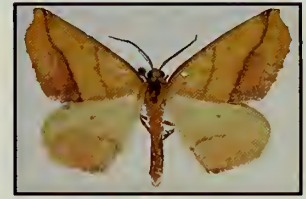
DISTRIBUTION AND ABUNDANCE Barrens and pine woodlands. Southern New England to Georgia (in mountains). Connecticut and Maryland: one generation with mature caterpillars from June to August, locally common.

COMMON HOSTS Pines, especially hard pines such as pitch and shortleaf pine.

REMARKS The taxonomy of the pine-feeding *Nepytia* is in great need of study—save vouchers. True *Nepytia pellucidaria* was a large species that occurred on hard pines in eastern Canada and northern New England; it is thought by some to be extinct. The caterpillar that we figure may represent an as yet unrecognized species that replaced it to the south. A large, fall-flying *Nepytia* from loblolly pine woods on the Delmarva Peninsula (known from males only) may be an outlying population of *N. pellucidaria* that still survives. Brightly colored geometrid caterpillars are rare in temperate forests, most being remarkably cryptic in form and habit. In other Lepidoptera these colors would be *prima facie* evidence of chemical protection. The boldly marked pupa, visible through the flimsy walls of the cocoon, is further testimony that the Festive Looper is an unpalatable species. The egg overwinters.



Two-pronged Looper (*Sicya macularia*)
[Sharp-lined Yellow]



Unpaired tonguelike lobes over the dorsum of A3 and A5 instantly distinguish the caterpillar from all others in the East. An oblique white line runs up the outer side of the anterior proleg. Additionally, look for a small hump over A8 and a broad russet band on the head that narrows towards the antenna. The paraprocts and hypoproct are modestly developed. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to Georgia and Missouri. Connecticut and Maryland: one generation with mature caterpillars from May into July, uncommon.

COMMON HOSTS Alder, ash, aspen, birch, blueberry, cinquefoil, currant, maple, New Jersey tea, poplar, spirea, and willow; reports from fir, pine, and other conifers require verification.

REMARKS We have tried unsuccessfully on two occasions to get eggs from gravid females; perhaps they require twigs of suitable hosts to stimulate their laying behavior. The egg overwinters.



Snowy Geometer (*Eugonobapta nivosaria*)

The green or brown ground color is paler where adjacent segments telescope into one another. In the individual that we figure, the skin is virtually translucent. What appears to be a spiracular stripe is actually the tracheal trunk (internal breathing tube) that connects the spiracles. In the green form there may be a rose flush to the legs and last abdominal segment. The head is unmarked. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Eastern Canada south to Georgia (in mountains), Missouri (Ozarks), and Kansas. Connecticut: one generation with mature caterpillars in May and June, common. Maryland: label data from captured adults suggest at least a partial second brood.

COMMON HOSTS Many trees and shrubs including some forbs, e.g., blue cohosh, cherry, dogwood, meadow rue, and sweet cicely.

REMARKS Given the dearth of host records and life history information for the Snowy Geometer, we are guessing that the caterpillar commonly occurs on shrubs and low-growing plants where they escape the attention of foresters. The eggs, laid in elongate rows, overwinter (Rupert 1972).



Purplish-brown Looper (*Eutrapela clemataria*)
[Curve-toothed Geometer]



The anterior edge of T2 forms a raised collar that frames the front end of this gray to brown or purple-brown stick mimic. Note also the eared ridge over A4 and a set of smaller warts atop A8. All three of these raised areas are often darkly pigmented and dotted with orange. The somewhat flattened head is uniformly brown or darkened with vague markings; sometimes there is a pale patch about the eyes. Stubby paraprotecs extend beyond the anal plate. Mature larva to 6 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Minnesota to Newfoundland south to Florida and Texas. Connecticut: one principal generation with mature caterpillars in June and July, and a small second generation in September and October, common. Commonly with two generations from Pennsylvania southward.

COMMON HOSTS Many woody shrubs and trees including ash, basswood, birch, cherry, cranberry, currant, dogwood, elderberry, elm, gale, maple, oak, poplar, sweet gum, viburnum, and willow, as well as softwoods such as fir and hemlock.

REMARKS Like other twig-mimicking inchworms, the venter is colored much like that of the dorsum, and the last four abdominal segments are bunched together. Caterpillars of the Purplish-brown Looper adopt two resting positions. In the first, the legs are held tightly against the thorax and the head is rolled under; the anterior end of the body thus resembles a fist. In the second, the swollen third pair of legs may be held outward, in such a way as to resemble the scar left after a leaf has dropped from a twig. The pupa overwinters in surface litter.



Juniper Geometer (*Patalene olyzonaria*)

The complex patterns of diamonds, dashes, and lines distinguish this elongate caterpillar from others that feed on cedar. The darkened dorsum is edged with a broken black and white stripe that undulates along its length.

The sides of the abdomen bear pale green to cream patches anterior to each of the spiracles. There is a pair of minute, black dorsal warts on A8. Long pale antennae project from the head; a short dark line runs over the vertex, but fades away at the level of the triangle. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Fields, open woodlands, and cedar swamps. Upper Midwest to central New England south to Texas and Florida. Connecticut and Maryland: at least two generations with mature caterpillars from June onwards, common.

COMMON HOSTS Atlantic white cedar, junipers, and possibly arborvitae.

REMARKS One could scarcely design an insect to match its background better than the Juniper Geometer. Not only does it match cedar foliage in both color and pattern, but even its texture, shape, and reflectance seem tuned for a life on cedar. It rests twiglike with the anterior end of the body raised, attached only by a safety line. Summer generation caterpillars pupate in a sparse cocoon amongst foliage. Even dark brown caterpillars fade to green prior to pupation to yield a green and white pupa that is virtually impossible to locate among the scalelike leaves. The Juniper Geometer overwinters as a pupa.



Large Maple Spanworm (*Prochoerodes lineola*)(= *Prochoerodes transversata*)



Its large size, bulging second thoracic segment, and dorsal warts on A4 and A8 distinguish this caterpillar. Color and pattern are exceptionally variable, although many caterpillars end up being some shade of tan to purple-brown. A group of small warts are set over A5. On some caterpillars there are two oblique lines that run out from the anterior proleg: the first is short, well-defined, and extends less than halfway to the spiracle on A5; the second is longer, ill-defined, and directed towards the spiracle on A8. The head is somewhat flattened, usually with two pale lines across the face: the upper one runs between the eyes, and the lower one between the antennae, over the clypeus. The paraproct is well-developed with a prominent apical seta. Mature larva to 5 cm. Some color forms of the Large Maple Spanworm resemble caterpillars of the Variable Antepione (*Antepione thisoaria*) and Slant-lines (*Tetracis*), but T2 tends to be less swollen in the Large Maple Spanworm and the last abdominal segments are rarely marked with the black middorsal stripe common to these other larvae.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Great Lakes Region to Nova Scotia south to Florida and Texas. Connecticut: seasonal phenology remains unclarified; apparently there is a single principal generation with mature caterpillars from June through August (adult captures span all months of the summer and fall, with most coming from late July through September), common. Maryland: two generations.

COMMON HOSTS Woody shrubs and trees including birch, blueberry, cedar, cherry, currant, dogwood, fir, gale, hemlock, larch, maple, oak, poplar, spirea, spruce, viburnum, walnut, and willow, but also grasses, crops, and ornamental flowers.

REMARKS Wildly variable in both color and pattern, the Large Maple Spanworm is a showcase example of why coloration should be used guardedly when making geometrid larval determinations. The frosted form, with its whitish saddle, is a striking insect that resembles a twig with exfoliating bark. Frosted forms also occur in Slant-lines (*Tetracis*). The seasonal phenology of this insect in southern New England is a bit of enigma, perhaps the first brood is only partial as is the case for the Northern Pine Looper. Over much of New England, the egg overwinters.



White Slant-line (*Tetracis cachexiata*)



This brown or gray caterpillar has a flattened head and a conspicuously thickened T2. In both this and the next species, T2 may be quite angulate in resting caterpillars. Both A4 and A5 have a pair of dorsal warts that may be connected by a ridge; smaller warts are also present over the more anterior abdominal segments. Often there is a wavy black line above the anterior proleg. On the anterior abdominal segments the side of the body may be pinched into a short oblique ridge anterior to each of the spiracles. A conspicuous black middorsal line runs from the anal plate forward to at least A8. One especially reliable feature is the head coloration: the triangle and dorsal midline tend to be lightly pigmented and are abruptly bounded by a diffuse field of black that intensifies over the top of the head. The paraprocts and hypoproct are well-developed. Mature larva to 4.5 cm. Caterpillars of the Yellow Slant-line (*Tetracis crocallata*), Variable Antepione (*Antepione thisoaria*), and Large Maple Spanworm (*Prochoerodes lineola*) can be similar to those of the White Slant-line.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to northern Florida and Arkansas. Connecticut and Maryland: essentially one generation with mature caterpillars from late July to October, very common. A small percentage of the pupae hatch in late summer and yield a second brood; the fate of this second generation of caterpillars in Connecticut is unknown.

COMMON HOSTS A wide variety of hardwoods and softwoods including alder, ash, basswood, birch, bittersweet, black gum, cherry, elm, fir, gale, hemlock, ironwood, larch, laurel, maple, ninebark, oak, pine, poplar, spruce, sweetfern, viburnum, and willow.

REMARKS The White Slant-line is a fine stick mimic endowed with numerous warts and barklike coloration. All three sets of legs are held tightly against the underside of the thorax when at rest. We commonly encounter caterpillars while beating in August and September. It overwinters primarily as a pupa.



Yellow Slant-line (*Tetracis crocallata*)

Like the White-slant Line (*Tetracis cachexiata*) and the Variable Antepione (*Antepione thisoaria*), coloration is exceptionally variable, ranging from brick red through tan, gray, and brown. At rest the first thoracic segment may be pulled into the second; in this position, the corners of T2 project forward in such a way as to resemble little ears. The body may be faintly marked with numerous, thin, wavy stripes. In our collections the abdominal warts and ridges on A4 and A5 are less evident than those of the White Slant-line; in addition, the black middorsal stripe on the last three abdominal segments is less conspicuous. Look for a black crescent or U-shaped mark that passes from the top of the head through the upper part of the triangle, and a thin black line above the proleg that runs parallel to the body axis. Mature larva to 4.5 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Transcontinental in Canada south in the East to Georgia and Texas. Connecticut: one principal generation with mature caterpillars in July and August, moderately common. There is at least a partial second generation from New York and Connecticut southward, with larvae late into the fall. Maryland: two full generations.

COMMON HOSTS A variety of hardwoods including alder, birch, boxelder, cherry, chestnut, elderberry, sumac, and willow.

REMARKS Caterpillars of the Yellow Slant-line often remain twiglike even after discovery, either feigning death or moving very slowly. We have found the caterpillar while beating—it is much less common than the White Slant-line. Most individuals overwinter as pupae in New England.



Variable *Antepione* (*Antepione thisoaria*)



Like the other caterpillars in this group, the ground color is highly variable and the second thoracic segment is swollen. In the “frosted” form the dorsum is splashed with white. The body, thickest near its back end, is often longitudinally streaked by a series of vague, wavy stripes. Pimplelike warts bear the posterior pair of dorsal setae over A4; the warts on A5 are small, less than half the size of those on A4. The anterior face of thoracic shelf is often blackened to either side with addorsal and subdorsal stripes running down to the dorsum of T1. The head is dorsoventrally flattened with two to three light lines on each cheek; the triangle is often darkened. The last abdominal segments have a darkened middorsal stripe, conspicuous paraprocts, and a sharp, whitish hypoproct. Mature larva to 4 cm. The caterpillar is similar to those of the Slant lines (*Tetracis*) and Large Maple Spanworm (*Prochoerodes lincola*).

DISTRIBUTION AND ABUNDANCE Woodlands and coastal shrublands. Canada south to Georgia, Alabama, and Mississippi. Connecticut: two generations with mature caterpillars in June and July, then again from late August through October, moderately common. Maryland: two or three generations. Only a single generation in Canada.

COMMON HOSTS Hosts include alder, apple, bittersweet, cherry, ninebark, persimmon, sumac, viburnum, and many others.

REMARKS The caterpillars of *Antepione*, *Prochoerodes*, and *Tetracis* have the same thoracic and abdominal swellings and dorsoventrally flattened heads. Another feature that is fairly consistent in this group is the black middorsal stripe over the posterior abdominal segments. All are stick mimics that attach a belay line to the host and hold the legs against the underside of the thorax. At night the caterpillars can sometimes be found hanging from silken lines an inch or so below host leaves. The pupa overwinters in *Antepione*.



Filament Bearer (*Nematocampa resistaria*)

Also known as the Horned Spanworm, this looper is instantaneously recognizable by its pale-tipped, eversible tentacles that extend from the dorsum of A2 and A3.

The ground color varies from yellow to brown. A pale lateral patch runs from above the proleg on A6 back at least to the spiracle on A8. Mature larva to 2 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands especially along edges, parks, meadows and other open habitats. Transcontinental in Canada south in the East to Florida and Texas. Connecticut and Maryland: one and at least a partial second generation with mature caterpillars in late May and June, then again in August, common.

COMMON HOSTS Many hardwoods and softwoods as well as low-growing plants including alder, ash, basswood, birch, blueberry, buckeye, carrot, catalpa, cherry, chestnut, dogwood, elm, fir, gale, hawthorn, hazelnut, hemlock, ironwood, larch, maple, mountain ash, New Jersey tea, oak, spruce, strawberry, and willow.

REMARKS The larva rests exposed on upper leaf surfaces, with the body thrown into a loop that may extend forward over the head; at other times the head and thorax are held above the substrate. It is difficult for us to imagine what the larva is mimicking, but the overall effect is not unlike a fallen, brown flower with exerted stamens. The filaments may be extended an additional 200% when the caterpillar is alarmed. The egg overwinters.

Emeralds (Subfamily Geometrinae)

Three very distinctive forms occur in this subfamily, each representing a separate tribe. Once these are learned, all the Emerald caterpillars are instantly recognizable as such. The first group, represented by *Nemoria* and *Dichorda* in the East, is nothing short of bizarre: the abdomen sports winglike flanges. The second group of geometrines has very elongate caterpillars with deeply cleft heads. The last tribe has warts with recurved barbs to which plant fragments and other debris are attached. In all three groups the body is roughened and densely set with granules or spinules. The crochets are often separated into two groups. All caterpillars are slow moving; many “waggle” from side to side when disturbed or moving.



Red-fringed Emerald (*Nemoria bistriaria*)

Nemoria are bizarre caterpillars with densely spined bodies and winglike abdominal extensions on the anterior abdominal segments. Other conspicuous features include the dorsal spines on A8 and the abundance of thornlike processes that issue from the dorsum of the thorax. Ground colors range from tan and straw through rust, brick red, brown, and nearly black. In the Red-fringed Emerald the flanges of A2 and A3 tend to be proportionately longer than those of the other *Nemoria* treated here. Characters given in Ferguson (1985) work for some caterpillars but are unreliable for others. Mature larva under 2 cm. Because the caterpillars co-occur with those of the White-fringed Emerald (*Nemoria mimosaria*) and Red-fronted Emerald (*Nemoria rubrifrontaria*) over much of the Northeast, as well as those of other species southward and westward, identifications should be based on adults.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Extreme southern Canada to Florida and eastern Texas; absent from Maine. Connecticut: two generations with mature caterpillars in June and early July, then again from late August into October, common.

COMMON HOSTS Birch, gale, oak, sweetfern, and walnut, and other woody plants.

REMARKS Coloration and patterning in *Nemoria* are influenced by larval diet (McFarland 1988, Greene 1989). Full siblings of *Nemoria arizonaria* fed diets low in tannins were pale in color and possessed enlarged lateral flanges. Such caterpillars are often found on oak catkins (dangling male flowers) during spring. Siblings fed tannin-rich substrates, such as summer foliage, developed into a more twiglike form that was grayer in color with appreciably smaller flanges. Behavior, too, appears to be influenced by diet: pale caterpillars prefer to rest among catkins, whereas grayer caterpillars remain on twigs and stems. The extent to which the characters of eastern *Nemoria* are influenced by diet remains to be studied. The pupa overwinters in all eastern *Nemoria*.



White-fringed Emerald (*Nemoria mimosaria*)

The White-fringed Emerald is similar to the Red-fringed Emerald (*Nemoria bistriaria*) but is thought to have proportionately longer flanges on A4 and A5. Each flange bears two prominent teeth; in this species and the next, the anterior tooth is often considerably longer than the one that follows. Three dark stripes commonly run along the dorsum. Mature larva to 2 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Canada south to the Carolinas and the Gulf States but local and generally uncommon south of Iowa and New England. Connecticut: one generation with mature caterpillars from August to October, common. Maryland: at least a partial second generation.

COMMON HOSTS Many trees and shrubs including alder, basswood, birch, elm, fir, gale, hawthorn, hemlock, ironwood, larch, oak, spruce, and willow.

REMARKS Caterpillars resemble the withered catkins of oaks and other woody shrubs and trees. They are lethargic, feigning death when disturbed. The larvae chew away bits of leaf tissue from the blade, leaving behind a patchwork of holes and intact vascular tissue. The feeding damage creates a disrupted background, well suited to the caterpillar's outline. The pupa overwinters.



Red-fronted Emerald (*Nemoria rubrifrontaria*)

Perhaps inseparable from the White-fringed Emerald (*Nemoria mimosaria*) above, we illustrate this caterpillar to highlight the difficulty of using available descriptions to reliably identify larvae. Ferguson (1985) diagnosed caterpillars of the Red-fronted Emerald using the shape of the dorsolateral flanges, suggesting that the flanges in this species are more pointed than those of the Red-fringed (*Nemoria bistrifaria*) and White-fringed Emeralds. Yet the Red-fronted Emerald caterpillar that we illustrate has rather truncated flanges. It differs from all the *Nemoria* that we figure in having pronounced flanges all the way back to segment A8, but this too could be individual or environmentally induced variation—see Remarks below. Mature larva to 2 cm.



DISTRIBUTION AND ABUNDANCE Barrens, bogs, woodlands, coastal strand communities, and other sandy habitats. Eastern Canada to North Carolina, Alabama, and Kansas. Connecticut: two generations with mature caterpillars in June and July, then again from August to October, locally common. Only one generation in northern New England.

COMMON HOSTS Especially gale and sweetfern, but also reported from laurel, New Jersey tea, and sumac.

REMARKS Some of the characters used to distinguish *Nemoria* larvae by Ferguson (1985) have since been shown to be environmentally influenced. We reiterate, until more is understood about these exceptional insects, identifications should be based on adults. The pupa overwinters.



Braided Emerald (*Nemoria saturiba*)

Alternately patterned in green and brown, the caterpillar is colored unlike any other in the East. Segments A1, A3, and A5 are mostly yellow-green; other body segments are red-brown. The spines on the thoracic and abdominal segments are considerably smaller and duller than those of the other *Nemoria* in this guide. The subdorsal flanges, so characteristic of the genus, are poorly developed. Mature larva to 2 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Kentucky to Virginia south to Florida and eastern Texas. Virginia: two or three generations with mature caterpillars from June to November, locally common.

COMMON HOSTS Laboratory reared caterpillars accept sweet gum.

REMARKS The caterpillars are extremely lethargic and seemingly unflappable. In the hand they feign death; never have we observed quick movements in this or other members of the genus.



Appalachian Emerald (*Nemoria tuscarora*)

Wagner et al. (1998) mistakenly identified this caterpillar as that of the White-fringed Emerald (*Nemoria mimosaria*). Although adults of the two moths are “deceptively similar” (Ferguson 1985), their caterpillars are distinct. Larvae of the Appalachian Emerald are green, the skin minutely spined. Only A2 and A3 have conspicuous dorsolateral flanges, each reddened at the tip. The reddish middorsal stripe is most pronounced towards the rear of the body, and often missing over the thorax; it is bounded by yellow subdorsal stripes. Look for a yellow subspiracular stripe that runs to the anterior proleg. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Open meadows, woodlands, and bogs in transition and Canadian zone forests. Restricted to mountainous areas from Kentucky, West Virginia, and Maryland south to the Carolinas. Connecticut: absent. In western Maryland and mountainous areas of Virginia there are at least three generations with mature caterpillars from May onwards.

COMMON HOSTS St. John’s-wort and probably other woody plants.

REMARKS The larva figured here was collected at Goshen, Virginia, as a late last instar on the 21st of May—it survived an evening in a sub-freezing refrigerator that killed an underwing (*Catocala*) caterpillar.



Showy Emerald (*Dichorda iridaria*)

A most improbable caterpillar, its shape alone distinguishes it from any other in the East. Winglike dorsolateral flanges extend from the last two thoracic and first five abdominal segments. Two large hooked spines issue from the dorsum of A8. A black middorsal stripe runs from the thorax back to A8. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Fields, roadsides, and open woodlands. Southern Canada to Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars from June into July, then again from August into November, moderately common.

COMMON HOSTS Poison ivy and sumac.

REMARKS If there is a finite number of search images that a bird can retain while panning vegetation for prey, then surely this insect enjoys a measure of protection just by being so unlike other caterpillars. In several respects the larva resembles a dead, curled sumac leaflet. Often the caterpillar rests with the anterior portion of the body raised and looped or crooked to one side, further adding to its guise as a withered sumac leaflet. Caterpillars of the Showy Emerald have a single gear—slow. The pupa overwinters.



Camouflaged Looper (*Synchlora aerata*)
[Wavy-lined Emerald]



Quite literally, this is the trashiest inchworm in town, the caterpillar actively collecting and attaching plant fragments and other debris to its abdomen. The body is mottled in brown, black, and white, and its surface is densely set with minute spines. The primary setae are thickened and spinelike. An oblique white line runs through each spiracle. A white lateral stripe runs from A6 back to the anal proleg; a shorter, parallel line runs beneath, from the anterior proleg back to A9. Pale projections run along the dorsum of the abdomen to which petal fragments and other debris are bound with silk. Mature larva to 1.5 cm.

DISTRIBUTION AND ABUNDANCE Fields and other open habitats. Southern Canada to Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars from April into June, then again from July into September, common. One generation in northern New England.

COMMON HOSTS Often seen on composite flowers such as ageratum, aster, black-eyed susan, boneset, daisy, goldenrod, and yarrow; but also using blackberry, raspberry, rose, sage, St. John's-wort and other plants.

REMARKS This looper can change its appearance to match that of any flower that is deemed a suitable host. It is able to match its background by excising and attaching petal and other plant fragments to its body. The vestiture usually includes fresh stamens and petals, suggesting that debris is added daily. Larvae are easily found by scanning composite flower heads for anomalies. It overwinters as a middle instar larva.



Blackberry Looper

(*Chlorochlamys chloroleucaria*)

The head and first thoracic segment bear forward-projecting horns. The slender yellow-green body is generously salted with minute whitish granules; the setae are small and inconspicuous. There is often a brown to red middorsal stripe and vague spiracular, suprspiracular, and subdorsal stripes. Each of the anterior abdominal segments has six or seven annulations. The anal plate is strongly pointed. Mature larva to 2 cm. The horns on the thorax and head are smaller and less pointed than those of *Hethemia* and *Mesothea*.

DISTRIBUTION AND ABUNDANCE Woodlands, fields, and other open habitats. Canada south to Florida and Texas. Connecticut and Maryland: at least two generations with mature caterpillars from June to November, common.

COMMON HOSTS Fruits and other parts of blackberry, strawberry, and related plants; flowers of goldenrod, sunflower, yarrow, zinnia, and other composites; leaves of dogbane, sweetfern, and presumably many other plants.

REMARKS The caterpillar eats a curious array of foods, and may be unique among eastern geometrids in its predilection for fleshy fruits. The pupa overwinters.





Angle-winged Emerald
(*Chloropteryx tepperaria*)



The sixth abdominal segment is only half the length of A5 but twice the length of A7. The extremely slender, pale green body is densely set with minute spines. The deeply cleft head is often rotated under the horned first thoracic segment. All of the legs may be held together in a fist. Frequently the back of A1 is reddened. The anal plate, which may be brown or reddened or blackened, is drawn into a backward projecting spine, and is proportionately longer than that of *Hethemia* and *Mesothea*. The spiracles are black. Mature larva to 2.5 cm.

DISTRIBUTION AND ABUNDANCE Swamps, woodlands, and forests. Missouri to New Jersey southward. Connecticut: absent. Maryland and Virginia: two generations with mature caterpillars from April to June, then again in July and August.

COMMON HOSTS Bald cypress; accepting balsam fir and hemlock in captivity. It almost certainly has other hosts because it has been found where all of these trees are absent.

REMARKS The caterpillar rests with the anterior portion of the body elevated. When disturbed the caterpillar waggles from side to side. All hemitheines (emeralds with deeply cleft heads) are slow growers that take many weeks to mature. Presumably the pupa overwinters.



Pistachio Emerald (*Hethemia pistasciaria*)

Note the sharp horns on the head and segment T1. Conspicuous whitish granules are generously distributed over the caterpillar's slender body. The head, thoracic horns, legs, and posterior abdominal segments are often reddened. Sometimes the trailing edge of the first four abdominal segments is yellowed and possesses a middorsal spot. A strongly pointed anal plate extends well past the prolegs. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands, often common in oak-pine woodlands. Southern Canada to Florida and Texas. Connecticut: one generation with mature caterpillars from July to September, common. Maryland: at least a partial second generation.

COMMON HOSTS Basswood, birch, blueberry, ironwood, ninebark, oak, and presumably many other woody plants.

REMARKS The Pistachio Emerald and related hemitheines, with their very elongate bodies that tend to thicken towards the posterior end, appear to us to be petiole mimics. The pupa overwinters.



Day Emerald (*Mesothea incertata*)

Neither Ferguson (1985) nor McGuffin (1988) suggested characters that would distinguish caterpillars of the Day Emerald from those of the Pistachio Emerald (*Hethemia pistasciaria*). Like *Hethemia*, the caterpillars are yellow-green, with prominent horns on the head and T1. There is often a brown to reddish middorsal stripe and a red lateral line that runs between the prolegs. Mature larva to 2.5 cm. In our collections the thoracic horns of the Day Emerald are a bit more pointed, the body granules finer, and the anal plate proportionately longer than those of the Pistachio Emerald. It remains to be seen if any of these characters will prove reliable.



DISTRIBUTION AND ABUNDANCE Principally bogs in New England, but more northward in blueberry barrens and other heathy habitats. Arctic Circle south to Connecticut and Great Lakes Region. Connecticut: one generation with mature caterpillars from June to September, uncommon and local.

COMMON HOSTS Alder, birch, blueberry, cherry, cinquefoil, currant, gale, hawthorn, New Jersey tea, poplar, serviceberry, spirea, strawberry, sweetfern, willow, and presumably many other woody plants.

REMARKS If you see a green moth coursing over a bog in May or early June, it is likely that you have discovered this gem. The day-active adults possess a dense vestiture of hairy scales about the body and reduced eyes, reminders of this moth's boreal distribution. Confined females readily oviposit. The pupa overwinters.

Waves (Subfamily Sterrhinae)

Waves are exceptionally diverse in habit and form. Eastern sterrhines tend to be small caterpillars under 2 cm in length, have a shagreened integument, and have numerous annulations about the anterior abdominal segments. Certain diagnosis of the subfamily requires careful examination of the chaetotaxy (setal arrangement) and is beyond the scope of this guide. Interested readers should consult McGuffin's (1967) revision for the Canadian sterrhines. Nearly 50 sterrhines are illustrated in color by Porter (1997). Some Waves feed on the leaves of trees and shrubs, although most feed on low-growing herbaceous vegetation or even leaf litter. Like true butterflies, some sterrhines pupate exposed on surfaces with a girdle of silk fastened about the middle of the pupa. The subfamily is diverse in tropical regions.



Dotted Wave (*Idaea dimidiata*)

The caterpillar's elongate olive green to brown body appears corrugated with approximately 15 annulations encircling each of the anterior abdominal segments. The setae are short and peglike. Oddly, the minute, dark spiracles are shifted towards the dorsum of the first four abdominal segments, but otherwise are lateral as in other Lepidoptera. A subtle lateral flange runs the length of the body—the ground color is significantly darkened below it. The chocolate brown thorax has a wide tan middorsal stripe. The head is deep brown, except for the pale patch over each lobe. The dorsum of the first three to five abdominal segments is marked with a faint chevron. Mature larva under 2 cm. Several other *Idaea* occur in the East.



DISTRIBUTION AND ABUNDANCE Many habitats including woodlands and sand plains. A European species now established in the Pacific Northwest, southeastern Canada, and New England. Connecticut: one generation with mature caterpillars in May and June, locally common.

COMMON HOSTS Dead leaves of cherry and dandelion, but equally at home on green leaves and blossoms of many plants; in the case of blossoms, showing a preference for browned or senesced tissues.

REMARKS Caterpillars are extremely sluggish and will play dead if handled. Disturbed caterpillars rock from side to side. Larvae rest with the anterior end of the body raised: either fully extended at a 45° angle to the substrate or with a loop thrown into the abdomen and the thorax and head cocked upward in a reverse arch. One would rarely expect to encounter such a cryptic detritivore, but the caterpillars' propensity for the uppermost blossoms of plants, particularly composites, make them highly visible. Look for caterpillars in fall on senescent goldenrod blossoms. Caterpillars overwinter; pupation occurs in a loose cocoon amongst leaf litter in spring.



Rippled Wave (*Idaea obfusaria*)

Dark and coarse-skinned, this looper has a broad lateral flange that is especially prominent on A1 through A5. The body is dorsoventrally flattened with deep transverse creasing. There are minute spines over the thoracic segments. The setae are short, peglike, and possibly glandular. A horny anal plate projects beyond the posterior end of the body. The small black spiracles are positioned above the lateral flange. Mature larva to 1 cm. At least a half dozen species of *Idaea* are found in the East—identifications should be confirmed through rearing.



DISTRIBUTION AND ABUNDANCE Barrens and woodlands. Kansas to New York south at least to the Carolinas and Texas. Connecticut and Maryland; one generation with mature caterpillars principally in spring, with stragglers into July, locally common.

COMMON HOSTS Many plants ranging from low-growing forbs to woody shrubs and trees. Covell (1984) lists dandelion and clover. We reared caterpillars on oak.

REMARKS *Idaea* caterpillars are no less bizarre in habit than they are in form. They are scavengers that feed on a variety of live or dead plant tissues, and in the latter case, some long dead. One member of the genus (*Idaea bonifata*) sometimes infests dried flower arrangements and has even been reported as a herbarium pest. The caterpillar readily feigns death and drops from its perch if disturbed. The larva adopts a variety of resting postures, the most curious being that where it grasps the substrate with the thoracic legs and elevates the abdomen. Partially grown caterpillars overwinter.



Common Tan Wave (*Pleuroprucha insulsaria*)

Ground colors in this inchworm may be yellow, green, gray, or brown. Most forms are variegated with whites and browns. Anterior abdominal segments have approximately 10 deep annulations. The dorsum of each of the first five abdominal segments frequently is marked with a dark diamond- or spade-shaped spot; these same segments have an oblique brown line running through the spiracle. The pale subdorsal stripe continues onto the head. Dark spots may form a herringbone pattern over each lobe of the head. Mature larva to 2 cm. Caterpillars of the Common Tan Wave and Common Pug (*Eupithecia miserulata*) co-occur widely on flowers throughout the late summer and fall. The roughened integument and short peglike setae help distinguish larvae of the Common Tan Wave from all Pugs (*Eupithecia*).



DISTRIBUTION AND ABUNDANCE Grasslands, fields, and edges of woodlands. Great Lakes Region to Nova Scotia south to Florida and Texas. Connecticut and Maryland: evidently two or more generations with caterpillars from July to November, very common. A common species of the American tropics, possibly spreading to the more northerly parts of its range only as a seasonal immigrant.

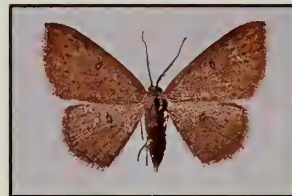
COMMON HOSTS Reliably found on goldenrod, but also reported from bedstraw, bittersweet, chestnut, coreopsis, corn, oak, and willow.

REMARKS At night the caterpillar may hang from vegetation, suspended on a short silk thread. In August and September look for caterpillars on the flowers of goldenrod and other plants. If you see frass below floral bouquets picked from the garden, it probably belongs to this caterpillar or that of the Common Pug (*Eupithecia miserulata*). The occurrence of adults throughout the growing season suggests that the Common Tan Wave is an annual migrant over much of the East. As in *Cyclophora* (below), the the pupa is essentially a chrysalis with a thoracic girdle and terminal cremaster; this stage overwinters, exposed on vegetation.



Packard's Wave (*Cyclophora packardii*)

The body is bright lime-green with a rusty head and rear. The thorax and abdomen are marked with numerous minute spots (only visible under a lens) that form thin broken stripes. Laterally there is a vague creamy spiracular stripe that is best developed toward the rear of the body. Below this stripe the ground color is paler. The rusty orange head is densely mottled with brown spots. A9, the anal plate, and posterior half of the anal prolegs are also rusty orange. The paraprocts and hypoproct are small. Mature larva under 2 cm.



DISTRIBUTION AND ABUNDANCE Woodlands and barrens. Missouri to Massachusetts south to Florida and Texas. Connecticut: at least two generations with mature caterpillars from late June into August, then again from September to November, local and uncommon. In Maryland at least three generations with caterpillars from June onwards, locally common.

COMMON HOSTS Oak.

REMARKS The caterpillar pupates exposed on the host, forming a chrysalis that is reminiscent of a swallowtail (papilionid) or white (pierid) butterfly pupa. It remains to be seen if the shared aspects are convergent, i.e., the similarities have obtained from different evolutionary starting points, or if the similarities are indications of an ancient shared ancestry. The pupa overwinters.



Sweetfern Geometer
(*Cyclophora pendulinaria*)



The exceptionally variable coloration of the caterpillar makes this species difficult to characterize. The ground color ranges from bright green to yellow, orange, brown, and purple-brown. Frequently there is a dark lateral spot near the spiracle on A1. Checkered forms may have a dark, oblique subdorsal splotch on the anterior abdominal segments. The heavy mottling over the head is often broken by a continuation of the subdorsal stripe and two short lines that run back from the eyes. A subtle lateral flange runs between the thoracic legs and anterior proleg. Mature larva to 1.5 cm. In addition to the above, two other species of *Cyclophora* occur in the East. *Cyclophora culicaria* (in the sense of Forbes 1948) from New Jersey and South Carolina is associated with sand myrtle, but it has yet to be reared (Dale Schweitzer, personal communication). *Cyclophora myrtaria* is a coastal plain species that occurs north to Martha's Vineyard, Massachusetts; it is very common through much of the South. Caterpillars of *C. myrtaria* have been reared on oak, but they are especially fond of myrtle.

DISTRIBUTION AND ABUNDANCE Sandy barrens, woodlands, and forests, especially those where bayberry, birch, and alder abound. Transcontinental in Canada south in the East to Georgia, Mississippi, and Arkansas; one report from Texas. Connecticut: two or possibly three generations with mature caterpillars to be expected from June until late October, very common.

COMMON HOSTS Alder, bayberry, birch, blueberry, gale, huckleberry, and sweetfern are preferred, but also larch, oak, and presumably others.

REMARKS The caterpillar perches exposed on a plant surface either with the thoracic legs attached and the body thrown up into a loop and pushed forward over the head or with the prolegs attached and the anterior end held free from the substrate. In the later case a belay line is commonly employed. In the looped position, the caterpillar often leans to one side. The caterpillar sometimes quavers from side to side, especially when changing or moving between perches. Late instar caterpillars feed on leaf undersides, scraping away patches of tissue but only occasionally eating all the way through to the upper leaf surface. The pupa overwinters.



Large Lace-border (*Scopula limboundata*)

All *Scopula* caterpillars are extremely elongate with as many as 30 annulations on some abdominal segments and a lateral flange that runs the length of the abdomen. The truncated anal plate extends beyond the base of the anal proleg. Ground color varies from green to brown, with mature caterpillars tending towards brown. In our collections, caterpillars have a dark middorsal stripe that is most evident over the abdomen. The lateral flange is often pale, especially anteriorly, as is the anal proleg. A prominent brown stripe runs along the side of the head to the antenna. Mature larva under 3.5 cm. A half dozen or so other *Scopula* species occur in the East.



DISTRIBUTION AND ABUNDANCE Wetlands, swamps, woodlands, and forests. Manitoba to Nova Scotia south in the East to northern Florida and Arizona. One generation at the northern limits of its range, generally two in New England. Connecticut: evidently one principal generation with mature caterpillars from late May to early July, and a partial summer generation, with caterpillars in late July and August, very common. Maryland: two generations with a partial third.

COMMON HOSTS Woody shrubs and trees and some herbs including blueberry, cherry, chokeberry, elm, shrubby cinquefoil, smartweed, sweet pepperbush, and three-seeded mercury.

REMARKS In Southeast Asia, adults of this genus are known to feed at blood, sweat, and the eye secretions of cattle and other animals (Bänziger and Fletcher 1985). The fourth instar larva overwinters (McGuffin 1967). *Scopula* is one of the world's largest genera of Geometridae, with over 700 described species.

Carpets (Subfamily Larentiinae)

The Larentiinae are the second largest subfamily of geometrids in eastern North America with more than 125 species. Being diverse in habit and form, the subfamily is difficult to characterize. McGuffin's (1958) diagnosis for the subfamily boils down to a single setal character, i.e., the presence of only three setae in the lateral group. None bears the ridges, warts, or swellings so common among the ennomines. The body is often elongate, widest near the anterior proleg, and the head tends to be small. Many Carpets feed on herbaceous vegetation, and thus they are not well-represented in this guide. Several are unusual in that they fashion and feed within shelters.



Dark Marbled Carpet (*Dysstroma citrata*)

Long paraprocts distinguish this greenish caterpillar from all others in this guide. The elongate body is nearly smooth and without warts. There are very faint middorsal, addorsal, subdorsal, and supraspiracular stripes. Occasionally there is red spotting in the middorsal stripe. McFarland (1963) describes a form with a reddish spiracular stripe. The setae are borne from minute white spots. Occasionally the paraprocts are flushed with rose, especially near their tips. The somewhat roughened head is green and unmarked. Mature larva to 3 cm. The Marbled Carpet (*Dysstroma truncata*) is similar but tends to be marked with more red, especially about the anal plate. Though the Marbled Carpet is generally distributed in Canada, it is increasingly restricted to mountains southward—in the Great Smoky Mountains it occurs only at the highest elevations.



DISTRIBUTION AND ABUNDANCE Mainly northern or Canadian Zone woodlands and bogs. Transcontinental across Canada south in the East to northern New England and North Carolina (in mountains). Connecticut: one generation with mature caterpillars in July and August, local in northeastern corner.

COMMON HOSTS Records for European and Pacific Coast populations include alder, blackberry, bluebell, blueberry, cinquefoil, currant, rose, snowberry, strawberry, and willow.

REMARKS Forbes (1948) notes the caterpillars usually feed on low-growing plants. The larva rolls its head under the body when disturbed, sometimes rolling the head back to the rear of the body (McFarland 1963). The egg overwinters. The closely related Marbled Carpet overwinters as a larva, and completes its development by July.



Orange-barred Carpet (*Dysstroma hersiliata*)

Caterpillars may be immediately recognized by their spinulose integument and the cream subdorsal stripe that runs the length of the lime-green body. The venter bears a pale, often broken, midventral stripe. Under a hand lens, a small white wart can be seen at the base of each seta. The head and legs may bear a hint of orange. Both the paraprocts and hypoproct are short. Mature larva under 2 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Much of Canada south in the East to North Carolina (in mountains), Minnesota, and South Dakota. Connecticut and Maryland: one generation with mature caterpillars in late May and June, rare and local.

COMMON HOSTS Currant or gooseberry.

REMARKS The caterpillar often rests with the abdomen thrown into a loop. We collected this caterpillar inadvertently, as a result of sweeping a currant shrub with a butterfly net. According to Forbes (1948) the cocoon is open and netlike, the pupa being visible within. Evidently the egg overwinters.



Hydrangea Spanworm (*Eulithis atricolorata*)
[Dark-banded Geometer]



Prominent subdorsal stripes run the length of this elongate, lime- to sea green caterpillar. Often there is a waxy bloom toward the rear of the body. The end of each abdominal segment may be yellowed. Laterally, the tracheal trunk that connects the spiracles is visible through the body wall. All of the spiracles are minute and either white or cream. The head, legs, and prolegs are green and unmarked. At the base of each of the short body setae, the ground color is deeper green. The large anal prolegs are splayed outward at rest. The paraprocts and hypoproct are small. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Woodlands and forests. New England to northern Florida and Arkansas. Connecticut and Maryland: one generation with mature caterpillars from May into early July, very local and rare in Connecticut but generally common in the Appalachians from Pennsylvania southward.

COMMON HOSTS Hydrangea.

REMARKS We found caterpillars of the Dark-banded Geometer commonly on the underside of new leaves. Look for leaves with one to several irregular holes cut out from the lamina, especially on upper shoots with new growth. Caterpillars often rest with the anterior end of the body held straight and away from the leaf. Each frass pellet is grabbed in the mandibles as it is released from the abdomen and then pitched from the feeding site—the toss lacks the force of other laurentiines. Because we found mature caterpillars at 3,000 feet in the Smokies during mid May, we assume that the egg overwintered.



Lesser Grapevine Looper
(*Eulithis diversilineata*)



A very elongate, yellow-green to red petiole mimic, this looper has a cleft head and conspicuous paraprotuberances. T2 bears a subtle, often pigmented, swelling. The sides of the head, legs, anterior prolegs, and paraprotuberances may be flushed with russet, red, or violet. Additionally, there may be a reddish middorsal stripe or spots over the anterior and posterior abdominal segments. The body setae are short and whitish. Mature larva to 4 cm. The Greater Grapevine Looper (*Eulithis gracilineata*) is a brownish twig mimic, with a darkly pigmented lateral swelling on T2 (Forbes 1948, McGuffin 1958). It, too, feeds on grape and Virginia creeper and is active in early summer; it has two or more generations from Maryland southward. The two species have much the same distribution, but the Greater Grapevine Looper ranges farther north, through New England and into southeastern Canada.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, and roadside edges. Montana, southern Ontario, and Massachusetts south to Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars in June and July, then again from August into October, common.

COMMON HOSTS Grape and Virginia creeper.

REMARKS From a distance, the caterpillar looks very much like a leaf petiole, especially if the anterior end of the body is grasping a leaf edge or lobe. Caterpillars can be found by searching the underside of grape leaves at night or by beating. We have collected red individuals in the fall that matched the fall coloration of grape petioles. The resemblance was so close that David Wagner's entomology students failed to recognize the insect as a caterpillar. The egg overwinters.



White *Eulithis* (*Eulithis explanata*)

The elongate brown to green body is stoutest about the hind segments. The heart is visible as a darkened middorsal stripe. Each abdominal segment may have a pair of short, oblique, dark lines extending back and away from the posterior dorsal seta. The setal bases are lightened. Brownish spots on the head are concentrated over the midline and over the lobes. The spiracles are blackened. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Bogs, barrens, heathy woodlands, and forests. Transcontinental in Canada south in the East to Georgia and Kentucky (in mountains). Connecticut and Maryland: one generation with mature caterpillars in June and early July, locally common.

COMMON HOSTS Blueberry.

REMARKS Twice, Warren Kiel (unpublished data) has reared from beaked hazelnut what Forbes (1948) recognized as *Eulithis explanata* form *cunigerata*. Given that many members of this genus are host plant specialists, it is possible that this form will prove to be a valid species. The egg overwinters.



Currant Eulithis (*Eulithis propulsata*)

The posterior end of each of the first six abdominal segments bears a middorsal chevron that is edged anteriorly with brown. Some individuals have an oblique brown line on the sides of both T2 and T3. The ground color may be yellow, tan, or gray. Abdominal setae are born from minute white bases; often there is a dark spot encircling the setal base posterior to the spiracle on A1-A6. The anal plate is brown. A white band runs down the anterior half of the anal proleg. The paraprocts and hypoproct are small. Mature larva to 3 cm.



DISTRIBUTION AND ABUNDANCE Woodlands and forests. Transcontinental in southern Canada, south in the East to North Carolina (in mountains). Connecticut: absent. In the southern Appalachians there is one generation with mature caterpillars from May into early July, local and uncommon.

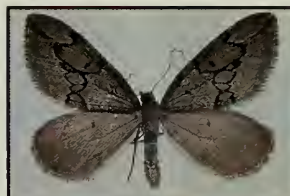
COMMON HOSTS Currant.

REMARKS We found our caterpillars of the Currant Eulithis while beating *Ribes* in the third week of May, high in the Appalachians. At this time of year, when the foliage is nearly fully expanded, geometrids abound on currant. The same afternoon that we found our Currant Eulithis larvae, we also encountered caterpillars of six other geometers, three noctuids, and a caterpillar of the St. Lawrence Tiger Moth (*Platartia parthenos*), a large "tiger" of great splendor. As in other Eulithis, the egg overwinters.



Evergreen Spanworm (*Thera juniperata*)

Small and unmistakable, this handsome caterpillar is conspicuously marked with four stripes: a broad, frosty blue-green middorsal; a yellow subdorsal; a red spiracular; and a white subspiracular. The head is tucked beneath the thorax and the last abdominal segments taper noticeably. There is a red flush over the legs. Mature larva to 1.5 cm. A native species, *Thera contractata*, occurs from central Massachusetts northward and westward. Ives and Wong (1988) claim that *Thera contractata*, which also feeds on common juniper, lacks a reddish spiracular stripe in the last instar.



DISTRIBUTION AND ABUNDANCE Woodlands, brushy fields, barrens, and balds. Introduced from Europe, now established from Ontario to Nova Scotia south into New England and the Great Lakes Region. Connecticut: One generation with mature caterpillars from July to September, very common.

COMMON HOSTS Common juniper.

REMARKS The caterpillar rests with the body extended along a needle. It can be taken in abundance with a beating sheet, especially from midsummer into fall. The adults fly very late in the year, often after the first frost. The egg overwinters.



Transverse-banded Looper (*Hydriomena divisaria*) [Black-dashed Hydriomena]



All of the *Hydriomenas* are short, stocky loopers with ill-defined markings and numerous setae above the anterior proleg. The Transverse-banded Looper appears banded, especially in middle instars, because less pigment is deposited at the front and back ends of many of the body segments. It is mostly brown or reddish brown with a darkened middorsal stripe, which intensifies over the prothoracic shield. The broad subdorsal stripe appears as a mosaic of pale tan and cream that is edged below by a dark supraspiracular stripe. Another pale stripe runs through the black spiracles. Well-marked individuals may have herringbone marks over the lobes and a black bar that reaches to the eyes. Below, the body is very pale, sometimes with a pinkish cast, especially at the front end of each segment. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Moist northern woodlands and coniferous forests. Saskatchewan to Newfoundland south to Wisconsin and North Carolina (in mountains). Connecticut and Maryland: one generation with mature caterpillars from August to October, common.

COMMON HOSTS Balsam fir, hemlock, larch, and spruce; McGuffin (1958) also lists pine.

REMARKS The wing patterning and coloration of *Hydriomena* adults are bewilderingly variable. Not surprisingly, taxonomic synonyms exist for all of the common eastern species. Fortunately, genitalic characters are reliable. Another handle for the genus is the larval-host associations—as for other larentiines, diets tend to be specialized. The pupa overwinters.



Transfigured Hydriomena

(*Hydriomena ?transfigurata*)



If caterpillars can be homely, then Hydriomenas are ripe for this appellation. Patterning in the Transfigured Hydriomena is highly variable and generally diffuse.

The ground color ranges from tan to straw. Commonly there are dark patches over the thoracic shield, the dorsum of anterior abdominal segments, and the anal plate. The dark coloration of the thorax spills down over the top of the head, and may reach well into the triangle. Both the paraprocts and hypoproct are very short in this genus. Mature larva to 3 cm. The caterpillar that we figure may in fact be the Sharp Green Hydriomena (*Hydriomena pluviata*), a closely related species that also feeds on oak; it is more prevalent over the southern part of the eastern United States.

DISTRIBUTION AND ABUNDANCE Barrens and oak woodlands. Manitoba to Nova Scotia south to New Jersey and Illinois; records south to Florida and Texas may refer to the Sharp Green Hydriomena. Connecticut and Maryland: one generation with mature caterpillars from July into October, common.

COMMON HOSTS Oak.

REMARKS *Hydriomena* are slow growing geometrids, grinding away at spring and hardened midsummer foliage, often for more than four months. The caterpillars form a crude silken shelter in which they hide by day. It is not surprising that coloration in *Hydriomena* caterpillars is bland—it seems to be a rule among caterpillars that the more time they spend hidden, the less they invest in coloration. This is especially true of caterpillars that are internal borers, as they are mostly unpigmented and uniformly unglamorous. The pupa overwinters in all *Hydriomena*.



Renounced Hydriomena
(*Hydriomena renunciata*)



Here is an ugly duckling, even among *Hydriomenas*—the ground color is dirt brown with broken, tan addorsal, subdorsal, and spiracular stripes. In deeply pigmented individuals these may be obscure. Sometimes there is a pinkish flush to the unpigmented venter. Like many other *Hydriomenas*, there are characteristic markings on the head: the darkened middorsal coloration extends forward over the vertex and continues through the triangle; laterally there are prominent black marks along the cheeks. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Forests, wetlands, and vicinity of lakes and streams. Transcontinental in Canada south in the East to West Virginia and Kentucky, and probably farther south in mountains. Connecticut and Maryland: one generation with mature caterpillars from July into October, common northward.

COMMON HOSTS Alder.

REMARKS The shelters of *Hydriomena* and other geometrids tend to be crude works relative to the neat, regular constructions of many lepidopterans. The caterpillars fashion their shelters by folding over a leaf edge or securing together two overlapping leaves. Frass pellets are often included in the silken perimeter of the shelter. The larva rests curled up in a C, with the head alongside the posterior abdominal segments.



Barberry Looper (*Coryphista meadii*)
[Barberry Geometer]



Robust in stature, this geometer may be easily recognized by its red-orange head and broad white spiracular stripe. The stripe is often infused with yellow or rust about the spiracles. Subtle addorsal and subdorsal stripes run through the brownish dorsum; the venter is brown. Mature larva to 2.5 cm.

DISTRIBUTION AND ABUNDANCE Forests, woodlands, parks, and yards. Transcontinental, south in the East to Florida and Texas. Connecticut and Maryland: three generations with mature caterpillars from June through early November, common.

COMMON HOSTS Barberry including introduced Japanese barberry.

REMARKS The caterpillars are occasional pests on ornamental plantings. The native host is thought to have been *Berberis canadensis*. By day, the caterpillar rests on the underside of a leaf or twig. When disturbed it coils up like a cutworm and drops to the ground. The pupa overwinters in a cell in the soil.



Cherry Scallop Shell
(*Rheumaptera prunivorata*)



Its nest and gregarious habit immediately distinguish the Cherry Scallop Shell. The dark dorsum is interrupted by three pale stripes and is bounded laterally by a white supraspiracular stripe. The orange head is unmarked. Below the supraspiracular stripe, the body is cream- to lemon-colored with darkened setal bases. Mature larva to 2.5 cm.

DISTRIBUTION AND ABUNDANCE Woodland edges, overgrown fields, and hedgerows. Southern Canada to Florida and Texas. Connecticut and Maryland: two generations with mature caterpillars in June and early July, then again from August to October, common.

COMMON HOSTS Black cherry.

REMARKS Occasionally the caterpillars are so abundant as to damage stands of black cherry. The caterpillars feed gregariously in a nest fashioned by tying up an entire shoot. The terminal shoot may be killed and thus the growth form of this important tree—whose wood is used in furniture making and cabinetry—may be compromised. There are other gregarious insects that make nests on black cherry including two species of web-spinning sawflies (*Neurotoma* species) and the Uglynest Caterpillar (*Archips cerasivoranus*). According to Forbes (1948) the caterpillars of the first brood of the Cherry Scallop Shells are less boldly marked. The pupa overwinters in leaf litter.



Scallop Shell (*Rheumaptera undulata*)

The ground color of this stocky, solitary, shelter-building caterpillar varies from pale beige, green, tan, or yellow to deep red-brown. The broad brownish supraspiracular stripe intensifies over the first thoracic and posterior abdominal segments; the thin addorsal and subdorsal stripes are broken into a series of whitish spots. A pale stripe runs above and below the black-ringed spiracles. The venter is pale and unmarked. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and the edges of wetlands. Transcontinental in Canada south in the East to Connecticut, Pennsylvania, and the Great Lakes Region. Also in Europe and Asia. Connecticut: one generation with mature caterpillars from August to October, uncommon.

COMMON HOSTS Alder, azalea (rhodora), blueberry, poplar, spirea, willow, and presumably other plants.

REMARKS The caterpillars make a loose shelter by tying together two or more adjacent leaves. The caterpillar tends to remove patches of tissue from the middle of the blade, leaving the edges intact. The pupa overwinters.



Spear-marked Black (*Rheumaptera hastata*)

This is one of only a handful of caterpillars in this guide with a semi-glossy integument. A prominent, subspiracular flange runs the length of the stout, brown to black body. In brown forms, a darkened middorsal stripe is bounded by pale addorsal stripes. A whitish subdorsal stripe, sometimes broken into a series of spots or absent, caps the broad, dark brown supraspiracular stripe. The abdominal spiracles are embedded in pale patches that may fuse to form a wide spiracular stripe. Often, a dark band encircles the front edge of each of the anterior abdominal segments. The head is a deep reddish brown. Mature larva under 2.5 cm. The White-banded Black (*Rheumaptera subhastata*) is similar in appearance; it, too, occurs south to North Carolina but is generally scarce.



DISTRIBUTION AND ABUNDANCE Forests and woodlands, especially edges and openings. Alaska to Labrador south in the East to North Carolina (in mountains), Tennessee, and Missouri. Also in Europe and Asia. Connecticut: one generation with mature caterpillars in July and August, uncommon.

COMMON HOSTS Many deciduous trees and shrubs, especially alder and birch, but also reported from blueberry, gale, hazelnut, poplar, sweetfern, and willow.

REMARKS *Rheumaptera* have day-flying adults that are on the wing in June and July. The caterpillar feeds between leaves it has webbed together. In Alaska it occasionally reaches densities high enough to defoliate stands of birch (Ives and Wong 1988). The pupa overwinters.



Mountain Carpet (*Entephria aurata*)

This handsome caterpillar may be immediately recognized by its pink middorsal triangles bordered by brown bars on the first six or seven abdominal segments. The ground color varies from green to brown. Mature larva under 3 cm. A second member of the genus, *Entephria separata*, co-occurs with the Mountain Carpet in northern New England and at high elevations in New York; there is a single specimen from Mount Mitchell, North Carolina.



DISTRIBUTION AND ABUNDANCE Heathy areas at high elevations. Eastern Canada south in mountains to New York and New Hampshire. Connecticut: absent. New Hampshire: one generation with mature caterpillars from mid June to early July.

COMMON HOSTS Blueberry, particularly bog bilberry (*Vaccinium uliginosum* var. *alpinum*).

REMARKS During the day the caterpillar rests with its head held downward and the body positioned parallel to the stem of the host plant. It feeds primarily at night or on overcast days. This moth is not uncommon above tree line in the White Mountains of New Hampshire. The larva overwinters.



White-ribbed Carpet (*Mesoleuca ruficillata*)

Surprisingly cryptic in both coloration and habit, this dull lime-green caterpillar's most distinctive feature is its wine-colored anal plate. The white spiracular stripe is edged below with red on the thoracic segments and above the anterior proleg; the whitish portion of the stripe runs forward to the antenna. The back edge of the first four or five abdominal segments may be yellowed. There is often a faint middorsal spot towards the back of A5. Reddish spotting is sometimes present on the upper portion of the head. The paraprocts and hypoproct are short. Mature larva under 3 cm.



DISTRIBUTION AND ABUNDANCE Wetlands and mesic woodlands and forests. Transcontinental in Canada and northern United States, south in the East to Pennsylvania, Ohio, and to Georgia (in mountains). Connecticut and Maryland: one principal generation with mature caterpillars in June and July, and a partial second generation from late August into October, uncommon.

COMMON HOSTS Alder, birch, and blackberry.

REMARKS The caterpillar often rests with a slight curve thrown into the body—the posterior abdominal segments directed off from the main body axis. The larva eats from the leaf edge, leaving it jagged and conspicuous. The pupa overwinters.



Double-banded Carpet (*Spargania magnoliata*)

The body is pale yellow to yellow-green with a pinkish flush about the thoracic legs and prolegs; some individuals bear a broad, dull red lateral stripe. The elongate body is thickest immediately forward of the prolegs. A pale midventral stripe runs the length of the abdomen. Setae are borne from minute white plates (visible only with a hand lens). A middorsal (heart) stripe, somewhat darker than the ground color, is usually visible. The pale green head appears small in proportion to the thorax. The paraprocts and hypoproct are very reduced. Mature larva under 3 cm.



DISTRIBUTION AND ABUNDANCE Openings in northern forests and woodlands. Transcontinental in Canada, south in the East to Georgia (in mountains) and Wisconsin. Connecticut and Maryland: one principal generation with mature caterpillars in June and July, and a partial second generation from late August into October, local and uncommon.

COMMON HOSTS Evening primrose and fireweed.

REMARKS The larva is an exceptional petiole mimic, usually attaching to a leaf blade both fore and aft. The pinkish flushes on the body closely match the pinks found on the petioles of evening primrose and fireweed, the principal hosts. When disturbed the larva draws its body into a coil. The cocoon may incorporate frass and bits of chewed plant tissue. The pupa overwinters.



Variable Carpet (*Anticlea vasiliata*)

The reddish caudal coloration and splayed anal prolegs distinguish the caterpillar from most others that occur in the region. The lime-green body is subtly ringed with yellow where the abdominal segments come together; each seta is born from a minute white pinaculum. The dorsum is very faintly striped with vague yellowish lines. A pale yellow spiracular line is often present on the thoracic segments. Each lobe of the head is reddened to either side of the triangle. Pink to red colors are also present on the thoracic legs, dorsum of A9, and the anal plate. The anal prolegs—cream forward and wine-colored rearward—are held splayed. Both the paraprocts and hypoproct are very short. Mature larva under 3 cm.



DISTRIBUTION AND ABUNDANCE Woodlands and forests, especially along edges. Transcontinental in southern Canada and northern United States, in the East south to North Carolina (in mountains). Connecticut and Maryland: one generation with mature caterpillars in June and July, locally common.

COMMON HOSTS Captive individuals accept blackberry.

REMARKS When disturbed, the caterpillar rolls its head under. The posture is somewhat odd as much of the abdomen is raised—the effect is reminiscent of a question mark. Like many laurentiine geometrids it removes patches of tissue from the interior portion of the blade. The pupa overwinters.



Red Twin-spot (*Xanthorhoe ferrugata*)

The stocky body—a jumble of browns, tan, and black—is thickest rearward. Often there is a black middorsal spot at the front edge of the first six abdominal segments. A black subventral line commonly extends forward from the anterior proleg. Additionally, many individuals possess a short black line forward of the spiracles on A2 to A5. A reliable feature is the dark lateral line on T2 that extends to the antenna; the head is pale to either side. The anal proleg is pale anteriorly and blackened rearward. The paraprocts and hypoproct are reduced. Mature larva to 2.5 cm. Several other *Xanthorhoe* caterpillars occur in the East. All are variable in coloration; our characterization may apply to more than one of these.



DISTRIBUTION AND ABUNDANCE Mesic forests, woodlands, wooded swamps, and wet meadows. Manitoba to Labrador south to North Carolina (in mountains) and the Great Lakes Region. Connecticut and Maryland: up to three generations with mature caterpillars from late May to November, common.

COMMON HOSTS Many low-growing plants including clover, dandelion, ground-ivy, knotweed, and pigweed.

REMARKS It is somewhat curious that these caterpillars of forbs and other low-growing plants are not green. The ground coloration of most caterpillars is not unlike wood or dried grass, perhaps because the caterpillars descend to the bases of their hosts by day. Disturbed larvae may rear backwards, occasionally even releasing the anterior forelegs, maintaining their purchase solely with their anal prolegs. Caterpillars pass through four instars, maturing in about four weeks. The pupa overwinters.



Unadorned Carpet (*Hydrelia inornata*)

The small yellow-green caterpillar is marked with a broad brown saddle over the thorax and brown splotches along the sides of the anterior abdominal segments. In some individuals the lateral spots fuse with the thoracic saddle and extend back along the sides to A5. The dorsum of A7, A8, and adjacent segments may also be marked with brown. The upper lobes of the head and thoracic shield are deeply pigmented. Both the paraprocts and hypoproct are very small. Mature larva to 1 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Eastern Canada south to North Carolina (in mountains) and Missouri. Connecticut: one principal generation with mature caterpillars in July and August, and a small second generation from late August to October, common. Pennsylvania and Maryland: two generations southward.

COMMON HOSTS Birch (also see Remarks below).

REMARKS The caterpillar rests on the undersides of leaves either with the body appressed along a vein or with the middle abdominal segments looped upward. Often there is a kink thrown in along the body axis, especially when the caterpillar is alarmed. All movements are slow in this seemingly unflappable caterpillar. It chews away patches of tissue from the middle of the leaf, leaving the margins intact. As the caterpillar moves about it lays down a strand of silk. The pupa overwinters. We have collected *Hydrelia* caterpillars on ash (*Fraxinus*) on three occasions. These caterpillars average larger and lack any hint of the brown mottling common to the birch feeding individuals. Here lies another project for the interested student: do these collections represent an unrecognized sibling species or merely an alternative color form?



Welsh Wave (*Venusia cambrica*)

Although variable in coloration, this small caterpillar can usually be recognized by its broad, yellowish subdorsal stripes and distinctive posture. In most individuals the ground color is pale, sea green to yellow-green; the dorsum is cream or yellow between the stripes, especially in younger larvae. Some individuals are also marked with red middorsal spots over the abdomen; others are red along the sides of the body; occasionally reddish saddles extend across T3, as well as A1 and A4. The small head is smooth, green, and unmarked. The paraprocts and hypoproct are very reduced. Mature larva less than 2.5 cm.



DISTRIBUTION AND ABUNDANCE Northern forests and woodlands. Alaska to Newfoundland, south in the East to the mountains of North Carolina; also Europe. Connecticut: absent. At high elevations in the Great Smoky Mountains there is one generation with mature caterpillars from June into August, abundant.

COMMON HOSTS Principally plants in the rose family such as cherry, mountain ash, and serviceberry; less frequently mentioned hosts include alder, birch, and willow.

REMARKS At rest, the caterpillar extends its body along the midrib of a leaf where, given its coloration, it can be difficult to detect. The caterpillar is slow and deliberate in movement, throwing the abdomen into a characteristic upside down U as it loops about—see comments under Brown-shaded Carpet (*Venusia comptaria*). Patches of tissue may be removed from a leaf edge or cut out of the blade. We have found caterpillars readily by searching the undersides of pin cherry leaves by flashlight, especially in the vicinity of leaf damage. They are easily collected with a beating sheet. The pupa overwinters.



Brown-shaded Carpet (*Venusia comptaria*)

The shiny integument of this small green caterpillar is transparent—both the gut and tracheae (breathing tubes) are visible, as are frass pellets as they form at the posterior end of the body. A cream subdorsal stripe is poorly developed, if present at all, over the thorax and posterior abdominal segments. The small head is smooth, pale green, and unmarked. Both paraprocts and hypoproct are very reduced. Mature larva approximately 1.5 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Ontario to Nova Scotia south to Virginia, Arkansas, and Iowa. Connecticut and Maryland: one generation with mature caterpillars from late May into early July, uncommon.

COMMON HOSTS Principally alder and birch; other listed hosts include beech and mountain ash.

REMARKS *Venusia* and *Hydrelia* caterpillars adopt a very characteristic posture, whereby the first six abdominal segments are thrown upward into a loop. The remaining segments are held against the substrate. The overall impact is not unlike the Greek letter omega. Also like *Hydrelia*, feeding caterpillars may remove patches of tissue from the interior of the leaf blade. The pupa overwinters.





White-striped Black (*Trichodezia albovittata*)

The head and anterior of the body are narrow—the body is thickest about the anterior proleg. A blackish spiracular stripe on the thorax continues across the front of the head, running through the top of the triangle; on each side of the head a short black spur extends down to the eyes. Behind the thorax, the dark stripe is replaced by a pale spiracular stripe, which is, in fact, the tracheal trunk, visible through the body wall. The anal plate is reddened. The paraprocts and hypoproct are extremely reduced. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Manitoba to Labrador south to Georgia and Kansas. Connecticut and Maryland: two generations with mature caterpillars from July to October.

COMMON HOSTS Touch-me-not or impatiens.

REMARKS The young caterpillars provide yet another outstanding example of mimicry, as they closely resemble the floral or fruit petioles of impatiens. The caterpillars can be located by looking for leaves with irregular holes to either side of the midrib. Look for recent damage, especially on younger leaves. The caterpillar grabs each frass pellet with its thoracic legs as it is released from the abdomen, and then tosses it from the plant. Our captive prepupal larvae excised dozens of leaf fragments and incorporated these into the outer wall of their cocoons. The pupa overwinters.



The Autumnal Moth (*Epirrita autumnata*)

The ground color varies from bright yellow- to lime-green; the blue-green venter appears frosted. European populations are sometimes marked with red or russet blotches (Porter 1997). A white spiracular stripe runs along the lower edge of the orange spiracles and continues onto the anal plate. Subdorsal and supraspiracular stripes are faint and incomplete. On the upper half of the body each setal base is situated in a pale spot. The head is smooth and unmarked. The crochets are in a single unbroken group. Both the paraprocts and hypoproct are small. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to North Carolina (in mountains). Connecticut: one generation with mature caterpillars in May and June. Maryland: no records.

COMMON HOSTS Many shrubs and trees including alder, aspen, blueberry, fir, hemlock, poplar, spruce, and willow.

REMARKS The caterpillars are new-leaf specialists that hatch from the eggs just as the leaf buds begin to open. According to Porter (1997), *Epirrita* caterpillars are readily collected by beating. The adults emerge and lay their eggs in late fall.



The Bruce Spanworm (*Operophtera bruceata*)

Except for its plump aspect, the caterpillar is rather undistinguished. Typically it is pale green, but under outbreak conditions many individuals are gray, smoky, brown, or white and black. Look for a dark middorsal (heart) stripe that runs the length of the abdomen and a well-defined subdorsal stripe that sits over a weak, mostly broken supraspiracular stripe. Another faint stripe runs through the spiracles. The integument between adjacent abdominal segments is pale. Many of the setae arise from minute whitish spots. Virtually all of these coloration characters break down in some individuals, especially during outbreaks. The head ranges from pale green to shiny black. *Operophtera* caterpillars have an extremely long and slender spinneret (silk-spinning structure). Mature larva to 2 cm. The closely related Winter Moth (*Operophtera brumata*) is an introduced pest in the Maritime Provinces and the north Pacific Coast between southern British Columbia and Oregon.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Pacific Northwest to Nova Scotia south in the East to Maryland and Missouri. Connecticut and Maryland: one generation with mature caterpillars from late April to June, uncommon most years but occasionally a serious forest pest.

COMMON HOSTS Many shrubs and trees including alder, aspen, beech, birch, cherry, elm, hazelnut, maple, oak, serviceberry, willow, and witch-hazel.

REMARKS The caterpillar rests on the underside of a leaf, with the head coiled back. Some fashion a crude leaf shelter in which they pass the day. During outbreaks, the caterpillars may enshroud entire trees in ghostly sheets of silk. *Operophtera* caterpillars are active early in the year, maturing as early as the first week of June. Our image is of a wild-collected caterpillar that was not reared to the adult stage, and hence may represent another species. A second collection of this species was placed in a refrigerator to cool down for a few days until a series set of photographs could be secured, but the caterpillars continued to feed and pupated in the refrigerator before photographs could be shot. Adults emerge very late in the year, after the first frost. The slender males may be seen fluttering about even when temperatures drop into the upper twenties (Fahrenheit). The orange eggs, laid in bark crevices by the wingless females, overwinter.



Juniper Looper (*Eupithecia interruptofasciata*)

Eupithecia is the largest genus of North American moths, with more than 140 species currently recognized, at least 40 of which occur in the East. The caterpillars are remarkably diverse in both form and habit.

Coloration may be highly variable within a species, thus complicating larval identification. The caterpillars are generally under 2 cm, the cuticle roughened, the body annulated, and the paraprocts long and pointed. Some are very slender, while others are squat with short prolegs. Many are specialized in diet; a few are wholly catholic. A number of the concealed feeders that tunnel into cones, flowers, or fruit are scarcely capable of walking. Identifications are difficult, even with both stages in hand; genitalic preparations are often necessary. The Juniper Looper caterpillar is deep or smoky green, with a broad spiracular stripe that may be yellowed about the spiracles. The darkened middorsal stripe continues onto the anal plate but is often weakened towards the head. There is a very weak subdorsal stripe. The head may be mottled with dark spotting. Mature larva under 2 cm.

DISTRIBUTION AND ABUNDANCE Shrubby fields, pastures, barrens, and open woodlands. Transcontinental in Canada south at least to Connecticut; records from farther south require confirmation. Connecticut: one generation with mature caterpillars from May to early July, locally common.

COMMON HOSTS Common juniper.

REMARKS The larval coloration is such that visual searches yield few individuals from the same plants that yield numerous caterpillars upon beating. The adults fly from late summer to October. The egg overwinters.





Larch Pug (*Eupithecia lariciata*)

The Larch Pug or Fir Needle Inchworm is green, russet, brown, or purple-brown with dark middorsal and midventral stripes, and rather variable patterning. Often there is a blurry subdorsal stripe that is pale above and dark below. The anterior abdominal segments are deeply corrugated; each bears approximately eight transverse creases. A pale flange runs from the anal plate to the thorax; the ground color is often darker below this line. The body setae tend to be pale and less conspicuous than those of the Early Brown Looper (*Eupithecia annulata*), another common conifer-feeding Pug. More than a half dozen Pugs are recorded from conifers in the East, so identifications should be made with caution. Mature larva to 1.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to Connecticut, New York, and Great Lakes Region. Connecticut: one generation with mature caterpillars from mid July through September, locally common.

COMMON HOSTS Fir, hemlock, larch, and spruce, less commonly pine and other conifers.

REMARKS Bolte (1990) synonymized *Eupithecia luteata* (Fir Needle Inchworm) under *E. lariciata* (Larch Pug). The caterpillar looks remarkably like a dead needle. When beating, gently tip away excess plant debris on your sheet, then carefully examine the remaining “needles” to see if any have legs! Larch Pug is a bit of a misnomer as fir seems to be the favored host at many sites. The pupa overwinters.



Common Pug (*Eupithecia miserulata*)

Highly variable in coloration, this caterpillar often has a herringbone pattern made up of oblique subdorsal lines. A subspiracular band runs from the thorax to the edge of the anal plate. Most individuals have darkened arrow-shaped marks over the first five or six abdominal segments. Mature larva to 2 cm.

DISTRIBUTION AND ABUNDANCE Open woodlands, meadows, and gardens. Transcontinental in Canada south in the East to Florida and Texas. Connecticut: at least two generations with mature caterpillars from June to November, very common. Maryland: three or more generations.

COMMON HOSTS Many woody plants such as chinaberry, gale, grape, holly, ninebark, oak, viburnum, and willow; also common on composites such as aster, black-eyed susan, fleabane, joe-pye-weed, and yarrow.

REMARKS Whereas many of the 40 eastern *Eupithecia* are specialized in diet, the Common Pug is remarkably polyphagous. It is a regular in gardens, where it can be seen feeding on the blooms of a variety of plants. On grape, our larvae preferred to eat dead flowers over green leaves. While washing dishes one evening, Dave Wagner once observed a Common Pug caterpillar consuming a fellow larva in the floral bouquet above his sink. In Hawaii, some *Eupithecia* are sit-and-wait predators that seize and consume small flies and a variety of other insects that venture too close. The pupa of the Common Pug overwinters.





Small Pine Looper (*Eupithecia palpata*)

Small and yellowish, this Pug has conspicuous annulations and a darkened middorsal stripe. The yellowish addorsal, subdorsal, and supraspiracular stripes are subtle, if present at all. In some individuals the subdorsal stripe is replaced by dark patches. A pale stripe runs along the crest of the raised lateral flange. The ground color may be flushed with pink below, especially about the prolegs. Mature larva under 2 cm.



DISTRIBUTION AND ABUNDANCE Pine barrens, woodlands, forests, and plantations. Transcontinental in Canada south in the East through New England and New York to North Carolina (in mountains); records from farther south (Florida) need confirmation. Connecticut and Maryland: one generation with mature caterpillars from June to October, locally common.

COMMON HOSTS Fir, larch, pine, and spruce.

REMARKS This species is frequently taken by beating. The pupa overwinters.



Great Variegated Pug
(*Eupithecia ravocostaliata*)



The cream and red lateral stripe of this handsome caterpillar is more intensely reddened towards the ends of the body. The lime-green dorsum is splashed with white dots; the venter is waxy blue-green. Except for black lateral eyes, the head is unmarked. The caterpillar is similar in coloration to that of the Sharp-lined Powder Moth (*Eufidonia discospilata*), which also occurs on willows. The Great Variegated Pug is easily distinguished from it by its more elongate paraprocts. Mature larva under 2.5 cm.

DISTRIBUTION AND ABUNDANCE Wet meadows, swamps, watercourses, and forests. Transcontinental in Canada south in the East at least to New Jersey. Connecticut: one generation with mature caterpillars in June, moderately common.

COMMON HOSTS Usually willow, but also recorded from alder, birch, cascara, cherry, poplar, and viburnum.

REMARKS None.



Green Pug (*Chloroclystis rectangulata*)

The stubby pale green caterpillar, thickest in the middle of the body, often has a wine-colored middorsal stripe. The pale orange head is unmarked. An orange flush may be present over the thoracic segments. Mature larva to 1 cm.



DISTRIBUTION AND ABUNDANCE Woodlands, orchards, and yards. First collected in Nova Scotia in 1970, and now established throughout southeastern Canada and the Northeast, and spreading rapidly westward and southward. A second introduction is established in the Pacific Northwest (British Columbia). Connecticut: one generation with mature caterpillars in May and early June, common.

COMMON HOSTS Apple and pear.

REMARKS The larva constructs a shelter in new leaves by pulling over a leaf edge or tying together two or more adjacent leaves. The shelter is messy, as the enclosed portions are partially eaten and discolored, and considerable frass accumulates within. It is an early species, maturing while the leaves are still expanding and hardening. In Europe, where the moth is native, it is occasionally numerous enough to be damaging. The egg overwinters on the bark of a twig, back from the terminal bud.



The Scribbler (*Cladara atroliturata*)

The body of this early-season caterpillar is emerald green above and waxy blue-green below; the heart is visible as a darkened middorsal stripe. There may be a vague, mostly broken, yellow spiracular stripe. The spiracles, intersegmental folds, tips of the prolegs, and edges of the anal plate are often yellowed. The hind pair of thoracic legs are longer than those of the two preceding segments. Although short, the paraprocts are distinctly visible in profile or from above. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south in the East to Georgia (in mountains) and Missouri (Ozarks); one report from Texas. Connecticut and Maryland: one generation with mature caterpillars in June, uncommon.

COMMON HOSTS Alder, birch, maple, oak, and willow.

REMARKS *Cladara* rest with the head tucked down under the thorax. The Scribbler is a new-leaf specialist that completes its development before the foliage is fully hardened. The pupa overwinters.



Yellow-lined Conifer Looper
(*Cladara ?limitaria*) [Mottled Gray Carpet]



Also known as the Dotted Line Looper and Green Balsam Looper, the caterpillar is green with a prominent cream spiracular stripe, and a thinner, more yellowed subdorsal stripe. Both tend to be poorly expressed on T1. The hindlegs are conspicuously enlarged. Mature larva to 2.5 cm. Although the caterpillars superficially resemble those of the Powder Moths (*Eufidonia*), they may be easily separated: in *Cladara* caterpillars the spiracular stripe ends at the spiracle on T1, whereas in Powder Moths it continues at least to the head, and sometimes to the antenna. The paraprocts, though small, are more developed in the Yellow-lined Conifer Looper. Another member of the genus, *Cladara anguilineata*, co-occurs with the Yellow-lined Conifer Looper over much of the East, ranging from Maine south to the Gulf Coast states. Our image may, in fact, represent *C. anguilineata*.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south to Georgia (in mountains) and Missouri. Connecticut: one generation with mature caterpillars in June, very common.

COMMON HOSTS Fir, hemlock, larch, pine, and spruce.

REMARKS The resting posture of the Yellow-lined Conifer Looper is unique among conifer-feeding geometrids: the head is rolled under the thorax. In the extreme, the head is tucked up under the third pair of legs, such that the anterior end of the body resembles a fist. The pupa overwinters.



Two-lined Aspen Looper
 (*Lobophora nivigerata*) [Powdered Bigwing]



The stocky green body sports two short taillike projections and a cream subdorsal stripe. Elongate swellings form a weak ridge below the spiracles. The green unmarked head is undistinguished except that the vertex is somewhat raised to either side of the midline. The anal proleg is flared downward, crudely resembling an elephant's foot. Mature larva to 2.5 cm.

DISTRIBUTION AND ABUNDANCE Forests and woodlands. Transcontinental in Canada south to Maryland, Indiana, and South Dakota. Connecticut and Maryland: two generations with mature caterpillars in late June and July, then again from August to October, common.

COMMON HOSTS Poplar, and, less frequently, willow.

REMARKS The caterpillar rests with the full length of the body held against the underside of a leaf. Curiously, the Two-lined Aspen Looper's posture and coloration are shared by three *Gluphisia* species (Family Notodontidae) which also park themselves on the underside of poplar leaves by day. Moreover, all are somewhat dorsally flattened. The pupa overwinters.



Three-patched Bigwing (*Heterophleps refusaria*)



Variegated in browns, the caterpillar's body is darkened above the spiracles; the venter is tan to light brown with a conspicuous midventral stripe. Under a hand lens, the body appears wrinkled or corrugated, especially along the sides of the abdomen and over the posterior half of each abdominal segment. A faint blackened middorsal stripe is discernible over the abdomen. The ends of the body are darkened. The tan to brown coloration of the venter extends above the spiracle on A4 to A6. Look for a tan stripe running along the outside edge of the anal proleg. The head bears a large brown to black patch that runs from the vertex down along the sides of the triangle; the lower half of the triangle is blackened. The paraprocts and hypoproct are reduced. Mature larva to 3 cm.

DISTRIBUTION AND ABUNDANCE Mesic woodlands and forests. Manitoba to Maine south to North Carolina and Missouri. Connecticut and Maryland: one generation with mature caterpillars from August to October, generally uncommon.

COMMON HOSTS Caterpillars reared in the laboratory accept clearweed and nettle.

REMARKS In the laboratory, caterpillars feed principally at night and rest at the base of the stem by day. Frequently they descend until the head is in contact with soil and other surface debris, or even leave the host and rest on nearby litter, where their coloration blends perfectly with wet leaves and other organic debris. Disturbed larvae may drop from their purchase and feign death; if pinched or otherwise threatened they may also wriggle. In both our *Heterophleps* the caterpillars heave their frass away from their feeding site. Each frass pellet is grabbed as it issues from the body and then hurled away—one 2.5 cm larva of the Three-patched Bigwing tossed its frass 40 cm from the host. The pupa overwinters.



Three-spotted Fillip (*Heterophleps triguttaria*)

Although not immediately recognizable, this greenish caterpillar possesses a suite of characters that assures its identification. The middorsum bears a broken wine-colored stripe—evident especially over the second two thoracic segments and between adjacent abdominal segments. Look for red dashes forward of the spiracle on A4 and A5. A deep burgundy line runs between the two prolegs; the portion on the anal proleg is edged above with cream. The black spiracles contrast sharply with the minute white plates at the base of each seta. The paraprocts and hypoproct are highly reduced. Mature larva to 2.5 cm.



DISTRIBUTION AND ABUNDANCE Mesic woodlands and forests. Wisconsin to Nova Scotia south in the East to Florida and Mississippi. Connecticut: evidently one generation with mature caterpillars from August to October, locally common. Maryland: two generations with mature caterpillars in July, then again from September into November.

COMMON HOSTS Clearweed; reports from maple may be in error (see Remarks).

REMARKS Any doubts about this caterpillar's identity can quickly be eliminated by poking it. Disturbed caterpillars coil up, wrapping the body two full revolutions about the head. At rest, the caterpillar perches outstretched, angled (head downward) out from a leaf or stem. It grabs the stem tenaciously, and is difficult to dislodge. We attempted to rear a clutch of eggs on red and sugar maple—all the caterpillars died without feeding. The site where we discovered the figured individual has yielded more than three dozen caterpillars on clearweed. The pupa overwinters.



The Bad-wing (*Dyspteris abortivaria*)

The elongate yellow-green body and thorned first thoracic segment set the caterpillar apart from all but a few eastern emeralds. The single caterpillar that we managed to rear to maturity has minute red spots (best viewed with a lens) at the back end of each abdominal segment: one over the dorsal midline and a second on the side of the body, just above the level of the spiracles. Toward the rear of the body the midline spot often extends onto the trailing segment—the red pigmentation is most conspicuous on A9. The integument is roughened especially about the thorax. The head is small and partially retracted into T1. The paraprocts are greatly enlarged and broadly joined to the anal prolegs. Mature larva to 2 cm.



DISTRIBUTION AND ABUNDANCE Woodlands and forests, especially along edges. Southeastern Canada to Florida and Texas. Connecticut and Maryland: one principal generation with mature caterpillars in June and July, locally common.

COMMON HOSTS Grape.

REMARKS Our captive female stacked her eggs in chains of 3-7 along the edge of a grape leaf. When fed fox grape our single last instar caterpillar shunned leaves and preferred to eat young tendrils. The caterpillar is remarkably cryptic in its form, coloration, and behavior. We leave it to the reader to decide if the caterpillar makes for a better petiole or tendril mimic. We have not seen evidence of the shelter forming behavior mentioned by Forbes (1954). The pupa overwinters.

SCOOPWINGS (FAMILY URANIIDAE)

Subfamily Epipleminae

This mainly tropical group has but two representatives in the East. Scoopwing caterpillars are markedly distinct from those of the geometrids: they are slow and stocky, with four sets of prolegs on A3 through A6. Because the caterpillars are fully legged, they do not loop like geometrids. Eastern scoopwings are wide-bodied caterpillars, drab in color with darkened setal bases (pinacula). The larvae may be distinguished from other lepidopteran caterpillars by the grouped subspiracular setae on the first three abdominal segments. On other abdominal segments (and in other Lepidoptera) these two setae, located immediately below the spiracle, arise from separate setal plates or warts. The prolegs are short and very slender, as they lack the swollen bases of other Lepidoptera. The crochets form an incomplete circle at either end of which the crochets are of two lengths; towards the center, only the smaller hooks are present. The scoopwings in the East are gregarious caterpillars that form a loose silken web or nest, at least in the early instars. The pupa overwinters in litter.



Brown Scoopwing (*Calledapteryx dryopterata*)

Variegated in smoky browns, this diminutive caterpillar has the darkened setal bases ringed by a pale area. Some individuals have a lightly pigmented splotch just anterior to the spiracle on A8. The small head is splattered with dark spots. The tiny anal prolegs splay back and away from the broadly rounded rump. Early and middle instars are undistinguished, green to cream caterpillars with or without darkened setal bases. Mature larva to 1 cm.



DISTRIBUTION AND ABUNDANCE Forests, woodlands, and wooded swamps. Southern Canada to northern Florida and Arkansas. Connecticut: two generations with mature caterpillars from late June to mid July, then again from middle August to early October, uncommon.

COMMON HOSTS Viburnum, especially nannyberry, wild-raisin, and related species.

REMARKS We found two larval clusters, each with three late instar caterpillars on leaf undersides. One cluster was located after we noticed a substantial amount of tiny black frass pellets that had accumulated on vegetation growing under a viburnum shrub. Two of the caterpillars were found, positioned almost end to end, under an abandoned sheet of spider's silk. In the laboratory, some larvae used a sparse web of silk to form a shelter between two overlapping leaves, into which they retreated by day. The caterpillars are readily taken while beating. Forbes (1923) reported that caterpillars retreat to the base of the host by day, ascending after dark to feed; however, as noted above, we have found caterpillars on the undersides of leaves by day.



Gray Scoopwing (*Callizzia amorata*)

Though tiny, the caterpillar is robust in stature; it has a darkened dorsum and pale venter. There is a darkened middorsal stripe and the bases of the dorsal setae are blackened. The brown dorsal area darkens progressively outward, ending in a brown supraspiracular stripe; this stripe carries forward onto the rounded upper lobes of the head. Mature larva to 1 cm.



DISTRIBUTION AND ABUNDANCE Forests. Transcontinental in Canada south in the East to northern Florida and Texas, but absent from much of southern New England. Connecticut and Maryland: absent. New York: two generations with mature caterpillars in June and July, then again from August to October, common.

COMMON HOSTS Honeysuckle and bush-honeysuckle. Not all honeysuckles are eaten: for example, caterpillars will starve if offered only Japanese Honeysuckle.

REMARKS When disturbed, both scoopwings are quick to drop down on silk lines. Warren Kiel (personal communication) found a cluster of caterpillars feeding gregariously in a crude nest.

APPENDIX A

Collection Data for Adult Images

Subfamily Archiearinae

Archiearis infans – Connecticut, March

Subfamily Ennominae

Alsophila pomertaria – Connecticut, March
Protitame virginalis – Connecticut, June
Heliomata cycladata – Virginia, May
Eumacaria latiferrugata – New Hampshire, August
Itame argillacearia – Connecticut, June
Itame coortaria – Ohio, June
Itame exauspicata – New York, July
Itame pustularia – Connecticut, August
Itame ribearia – West Virginia, July
Itame subcessaria – West Virginia, July
Epelis truncataria – Massachusetts, May
Mellilla xanthometata – Illinois, July
Macaria acmulataria – Connecticut, May
Macaria ulsterata – Nova Scotia, June
Macaria bicolorata – New Jersey, September
Macaria bisignata – Connecticut, July
Macaria minorata – Connecticut, July
Macaria transitaria – Connecticut, June
Macaria sexmaculata – Massachusetts, May
Macaria fissinotata – Connecticut, June
Macaria signaria – West Virginia, June
Macaria pinistrobata – Connecticut, June
Macaria granitata – New Jersey, September
Macaria multilineata – Connecticut, August
Digrammia continuata – Connecticut, May
Digrammia gnophosaria – Maryland, July
Digrammia ocellinata – Massachusetts, June
Trigrammia quadrinotaria – Tennessee, July
Enconista dislocaria – Nebraska, June
Orthofidonia exornata – Nova Scotia, June
Orthofidonia flavivenata – Nova Scotia, May
Hesperumia sulphuraria – Massachusetts, June
Ematurga amitaria – Connecticut, June
Hypomecis umbrosaria – Maryland, June
Glena cognataria – New Jersey, June
Glena cribrataria – Massachusetts, June
Glena plumosaria – New Jersey, June
Stenoporpia polygrammaria – Massachusetts, June
Aethalura intertexta – Nova Scotia, May
Iridopsis defectaria – Maryland, September
Iridopsis ephyriaria – Connecticut, August
Iridopsis humaria – Kentucky, April
Iridopsis larvaria – Connecticut, August
Iridopsis pergracilis – Texas, May
Iridopsis vellivolata – New Jersey, May
Anavitrinella pampinaria – Connecticut, June
Cleora projecta – Georgia, March
Cleora sublunaria – North Carolina, March
Ectropis crepuscularia – North Carolina, July
Protoboarmia porcelaria – Connecticut, June
Epimecis hortaria – North Carolina, March
Melanolophia canadaria – Maryland, May
Eufidonia convergaria – Connecticut, May
Eufidonia discospilata – Connecticut, June
Eufidonia notataria – Massachusetts, June
Biston betularia – Connecticut, May
Lycia rachelae – Alberta, April
Lycia ursaria – Connecticut, April
Lycia ypsilon – New Jersey, April
Hypagyrtis piniata – Connecticut, June
Hypagyrtis unipunctata – Connecticut, June
Phigalia strigataria – Connecticut, March
Phigalia titea – Connecticut, March
Palaearita vernata – Connecticut, April
Erannis tiliaria – Connecticut, November
Lomographa glomeraria – Connecticut, April
Lomographa semiclarata – Connecticut, May
Lomographa vestaliata – Connecticut, May
Cabera erythemaria – Connecticut, June
Cabera variolaria – Connecticut, June
Apodrepanulatrix liberaria – New York, September
Erastria coloraria – New York, April
Thysanopyga intractata – New Jersey, December
Lytrosis sinuosa – Virginia, June
Lytrosis unitaria – Connecticut, June
Euchlaena amoenaria – Virginia, May
Euchlaena irraria – New Jersey, June
Euchlaena marginaria – Rhode Island, May
Euchlaena obtusaria – New Jersey, September
Euchlaena tigrinaria – Connecticut, June
Xanthotype sospeta – New Hampshire, July
Xanthotype urticaria – Connecticut, August
Pero hubneraria – Connecticut, May
Pero morrisonaria – Connecticut, June
Nacophora quernaria – Nova Scotia, July
Campaea perlata – Connecticut, August
Ennomos magnaria – Connecticut, October
Ennomos subsignaria – Connecticut, July
Epirranthis substriataria – New Hampshire, April
Petrophora subaequaria – Connecticut, May
Tacparia detersata – Massachusetts, May
Homochlodes fritillaria – Nova Scotia, June
Gueneria similaria – Connecticut, June
Selenia kentaria – Connecticut, July
Metanema determinata – Connecticut, June
Metanema inatonaria – New Hampshire, July
Metarranthis duaria – Connecticut, May
Metarranthis hypochraria – Connecticut, June
Metarranthis obfirmaria – Connecticut, May
Cepphis armataria – Connecticut, June
Cepphis decoloraria – Connecticut, June
Anagoga occiduaria – Connecticut, May
Probole alienaria – Connecticut, June
Probole amicaria – Connecticut, April
Probole nepiasaria – Nova Scotia, July

Subfamily Ennominae (continued)

Plagodis alchoolaria – Connecticut, May
Plagodis fervidaria – Connecticut, May
Plagodis kuetzingi – Connecticut, May
Plagodis phlogosaria – Connecticut, May
Plagodis serinaria – Connecticut, May
Caripeta angustiorata – Connecticut, August
Caripeta divisata – Connecticut, July
Caripeta piniata – Connecticut, June
Besma endropiaria – Connecticut, June
Besma quercivoraria – Connecticut, August
Lambdina athasaria – Virginia, May
Lambdina fiscellaria – Nova Scotia, August
Lambdina pellucidaria – Maryland, May

Subfamily Geometrinae

Nemoria bistriaria – Connecticut, July
Nemoria mimosaria – Connecticut, May
Nemoria rubrifrontaria – Connecticut, May
Nemoria saturiba – Tennessee, September
Nemoria tuscarora – Virginia, September
Dichorda iridaria – Connecticut, May

Subfamily Sterrhinae

Idea dimidiata – Connecticut, July
Idea obfusaria – Texas, May
Pleuroprucha insularia – Connecticut, October

Subfamily Larentiinae

Dysstroma citrata – New Hampshire, September
Dysstroma hersiliata – Massachusetts, June
Eulithis atricolorata – Kentucky, July
Eulithis diversilineata – Connecticut, July
Eulithis explanata – Nova Scotia, August
Eulithis propulsata – Washington, June
Thera juniperata – Connecticut, October
Hydriomena divisaria – Maine, June
Hydriomena transfigurata – Nova Scotia, June
Hydriomena renunciata – New Hampshire, June
Coryphista meadii – Connecticut, July
Rheumaptera prunivorata – Connecticut, July
Rheumaptera undulata – Newfoundland, July
Rheumaptera hastata – Nova Scotia, July
Entephria aurata – Newfoundland, July
Mesoleuca ruficollata – Connecticut, June
Spargania magnoliata – New Hampshire, July
Anticlea vasiliata – New York, April
Xanthorhoe ferrugata – Massachusetts, May

Family Uraniidae

Calledapteryx dryopterata – Connecticut, June
Callizzia amorata – New Hampshire, June

Cingilia catenaria – Massachusetts, September
Nepytia canosaria – New York, September
Nepytia sp. nr. *pellucidaria* – Connecticut, July
Sicya macularia – Connecticut, June
Eugonobapta nivosaria – Connecticut, July
Eutrappela clemataria – Connecticut, May
Patalene olyzonaria – Connecticut, July
Prochoerodes lineola – Virginia, June
Tetracis cachexiata – Connecticut, May
Tetracis crocallata – Connecticut, May
Antepione thisoaria – Rhode Island, July
Nematocampa resistaria – Connecticut, July

Synchlora aerata – Connecticut, July
Chlorochlamys chloroleucaria – Connecticut, July
Chloropteryx tepperaria – Texas, August
Hethemia pistasciaria – Connecticut, June
Mesotheca incertata – Massachusetts, May

Cyclophora packardi – Maryland, April
Cyclophora pendulinaria – Connecticut, May
Scopula limboudata – Connecticut, July

Hydrelia inornata – Connecticut, June
Venusia cambrica – North Carolina, July
Venusia conptaria – Connecticut, April
Trichodezia albovittata – Massachusetts, May
Epirrita autumnata – Connecticut, October
Operophtera bruceata – Maryland, November
Eupithecia interruptofasciata – Connecticut, September
Eupithecia lariciata – Michigan, May
Eupithecia miserulata – Connecticut, November
Eupithecia palpata – Rhode Island, May
Eupithecia ravocostaliata – New Hampshire, May
Chloroclystis rectangulata – Connecticut, June
Cladara atrolittrata – Connecticut, April
Cladara limitaria – Nova Scotia, May
Lobophora nivigerata – Connecticut, May
Heterophleps refusaria – Virginia, June
Heterophleps triguttaria – Connecticut, July
Dyspteris abortivaria – Maryland, May

APPENDIX B

Collection Data for Larval Images

Subfamily Archiearinae

Archiearis infans - Massachusetts, D. Wagner, M. Nelson, and B. Williams colls.

Subfamily Ennominae

Alsaphila pametaria - New Jersey, D. Schweitzer coll.

Pratitame virginialis - Connecticut, D. Wagner and M. Thomas colls.

Heliamata cycladata - West Virginia, D. Wagner and L. Miller colls.

Eumacaria latiferrugata - Massachusetts, D. Wagner and E. Hossler colls.

Itame argillacea - West Virginia, M. Volovski coll.

Itame coartaria - Connecticut, J. Joseph coll.

Itame exauspicata - New York, T. McCabe coll.

Itame pustularia - Connecticut, V. Giles coll.

Itame ribearia - West Virginia, M. Volovski and D. Wagner colls.

Itame subcessaria - West Virginia, E. Hossler and D. Wagner colls.

Epelis truncataria - Massachusetts, D. Wagner and B. Williams colls.

Mellilla xanthametata - Illinois, B. Salazer coll.

Macaria aemulataria - Connecticut, D. Wagner coll.

Macaria ulsterata - Massachusetts, J. Fengler coll.

Macaria bicolorata - New Jersey, D. Schweitzer coll.

Macaria bisignata - Connecticut, D. Wagner coll.

Macaria minarata - Connecticut, D. Wagner coll.

Macaria transitaria - Connecticut, D. Wagner and F. Hohn colls.

Macaria sexmaculata - Connecticut, D. Wagner and K. Kubarek colls.

Macaria fassinata - Connecticut, C. Maier, J. Fengler, and C. Lemmon colls.

Macaria signaria - Ontario, R. and D. Wagner colls.

Macaria pinistrabata - Connecticut, F. Hohn coll.

Macaria granitata - Maine, J. Fengler and C. Lemmon colls.

Macaria multilineata - Connecticut, D. Wagner coll.

Digrammia cantinnata - Ontario, R. and D. Wagner colls.

Digrammia gnaphosaria - Maryland, A. Caldas coll.

Digrammia acellinata - Connecticut, D. Wagner coll.

Trigrammia quadrinataria - Tennessee, D. Wagner coll.

Encanista dislocaria - Nebraska, D. Ferguson coll.

Orthafidonia exarnata - West Virginia, D. Wagner and E. Hossler colls.

Orthafidonia flavivenata - New York, T. McCabe coll.

Hesperumia sulphuraria - Massachusetts, D. Wagner and E. Hossler colls.

Ematurga amitaria - Massachusetts, B. Williams and E. Hossler colls.

Hypamecis umbrosaria - Alabama, T. McCabe coll.

Glena cagnataria - New Jersey, D. Schweitzer coll.

Glena cribrataria - Massachusetts, D. Wagner and P. Goldstein colls.

Glena plumasaria - New Jersey, D. Wagner and E. Hossler colls.

Stenoparpia palygrammaria - Massachusetts, D. Wagner and P. Goldstein colls.

Aethalura intertexta - Connecticut, D. Wagner coll.

Iridopsis defectaria - New Jersey, D. Wagner coll.

Iridopsis ephyraria - Connecticut, E. Hossler and M. Thomas colls.

Iridopsis humaria - Virginia, J. Peacock coll.

Iridopsis larvaria - Connecticut, V. Giles coll.

Iridopsis pergracilis - Georgia, D. Ferguson coll.

Iridopsis vellivalata - New Jersey, D. Wagner coll.

Anavitrinella pampinaria - Illinois, D. Wagner coll.

Cleara prajecta - Georgia, D. Ferguson coll.

Cleara sublunaria - Virginia, D. Wagner coll.

Ectrapis crepuscularia - Tennessee, D. Wagner and M. Thomas colls.

Pratahoarmia parcelaria - Connecticut, M. Volovski coll.

Epimecis hortaria - Connecticut, M. Volovski coll.

Melanalopbia canadaria - Michigan, D. Wagner coll.

Eufidania canvergaria - Virginia, D. Wagner coll.

Eufidonia discaspilata - Massachusetts, D. Wagner and B. Williams colls.

Eufidania notataria - Connecticut, D. Wagner coll.

Bistan betularia - New York, D. Wagner coll.

Lycia rachelae - Canada, no other data.

Lycia ursaria - Connecticut, A. Brand coll.

Lycia ypsilon - New Jersey, D. Wagner and M. Volovski colls.

Hypagyrtis pinjata - Connecticut, M. Volovski coll.

Hypagyrtis unipunctata - Connecticut, J. Joseph coll.

Phigalia strigataria - Connecticut, D. Wagner, E. Hossler, and M. Thomas colls.

Phigalia titea - Connecticut, J. Joseph coll.

Paleacrita vernata - Connecticut, J. Joseph coll.

Erannis tiliaria - Virginia, M. Volovski coll.

Lamographa glomeraria - Connecticut, D. Wagner coll.

Lamographa semiclarata - Massachusetts, D. Wagner and B. Williams colls.

Lomographa vestaliata - Connecticut, M. Volovski coll.

Cabera erythemaria - Ontario, R. and D. Wagner colls.

Cabera variolaria - Connecticut, D. Wagner and M. Volovski colls.

Apadrepaulatrix liberaria - West Virginia, D. Wagner, and M. Volovski colls.

Erastris calararia - Pennsylvania, D. Schweitzer coll.

Thysanopyga intractata - New Jersey, D. Wagner and E. Hossler colls.

Lytrasis sinuosa - New Jersey, D. Schweitzer and D. Ferguson colls.

Subfamily Ennominae (continued)

Lytrosis unitaria - Connecticut, D. Wagner coll.
Euchlaena amoenaria - Virginia, D. Wagner coll.
Euchlaena irraria - New Jersey, D. Wagner and M. Volovski colls.
Euchlaena marginaria - New Jersey, D. Wagner and E. Hossler colls.
Euchlaena obtusaria - New Jersey, D. Wagner and D. Schweitzer colls.
Euchlaena tigrinaria - Connecticut, D. Wagner coll.
Xanthotype saspeta - Virginia, D. Wagner and Hossler colls.
Xanthatype urticaria - Connecticut, E. Hossler coll.
Pera hubneraria - Connecticut, D. Wagner coll.
Pera marrisanaria - Connecticut, M. Volovski coll.
Nacaphara quernaria - Connecticut, M. Volovski coll.
Campaea perlata - Connecticut, K. Hartan coll.
Ennamas magnaria - New York, T. McCabe coll.
Ennamas subsignaria - Connecticut, E. Hossler.
Epirranthis substriataria - New York, T. McCabe coll.
Petrphara subaequaria - Connecticut, D. Wagner and M. Volovski colls.
Tacparia detersata - Connecticut, D. Wagner coll.
Homachlades fritillaria - Connecticut, M. Volovski and M. Nelson colls.
Gueneria similaria - Connecticut, M. Nelson and M. Volovski colls.
Selenia kentaria - Tennessee, E. Hossler coll.
Metanema determinata - New York, V., R., and D. Wagner colls.
Metanema inatormaria - New York, R. and D. Wagner colls.
Metarranthis duaria - Pennsylvania, D. Schweitzer coll.
Metarranthis hypochraria - New Jersey, D. Schweitzer coll.
Metarranthis abfirmaria - Massachusetts, P. Goldstein coll.

Subfamily Geometrinae

Nemaria bistriaria - Connecticut, D. Wagner coll.
Nemaria mimosaria - New York, T. McCabe coll.
Nemaria rubrifrontaria - Connecticut, N. Sawyer coll.
Nemaria saturiba - Tennessee, D. Wagner and M. Thomas colls.
Nemaria tuscarara - Virginia, D. Wagner and E. Hossler colls.

Subfamily Sterrhinae

Idaea dimidiata - New York, T. McCabe coll.
Idaea abfusaria - New Jersey, D. Schweitzer coll.
Pleurapruchia insularia - Connecticut, D. Wagner coll.
Cyclaphora packardii - Tennessee, D. Wagner coll.

Subfamily Larentiinae

Dysstroma citrata - Oregon, J. Miller coll.
Dysstroma hersiliata - West Virginia, M. Volovski coll.
Eulithis atricalorata - Tennessee, D. Wagner and E. Hossler colls.
Eulithis diversilineata - Indiana, D. Wagner coll.
Eulithis explanata - Canada, no other data.
Eulithis prapulsata - Tennessee, D. Wagner and E. Hossler colls.
Thera juniperata - Connecticut, D. Wagner coll.
Hydriamena divisaria - Connecticut, M. Nelson and M. Volovski colls.
Hydriamena ?transfigurata - Connecticut, V. Giles coll.
Hydriamena renunciata - Connecticut, M. Volovski coll.
Caryphista meadii - Connecticut, D. Wagner coll.
Rheumaptera prunivorata - Connecticut, M. Volovski coll.
Rheumaptera undulata - Ontario, R. and D. Wagner colls.
Rheumaptera hastata - New York, T. McCabe coll.
Entephria aurata - New Hampshire, T. McCabe coll.
Mesaleuca ruficillata - Connecticut, D. Wagner coll.
Spargania magnaliata - Connecticut, D. Wagner and E. Hossler colls.

Cepphis armataria - Tennessee, I. Stocks coll.
Cepphis decalararia - New York, T. McCabe coll.
Anagaga accidiaria - Connecticut, D. Wagner coll.
Prabale alienaria - Connecticut, V. Giles coll.
Prabale amicararia - Maryland, D. Ferguson coll.
Prabale nepiasaria - Connecticut, M. Volovski coll.
Plagodis alcaolaria - New Jersey, D. Schweitzer coll.
Plagodis fervidaria - Connecticut, D. Wagner coll.
Plagadis kuetzingi - Connecticut, D. Wagner coll.
Plagadis phlagasaria - Connecticut, D. Wagner coll.
Plagadis serinaria - Connecticut, M. Nelson and M. Volovski colls.
Caripeta angustiarata - New York, T. McCabe coll.
Caripeta divisata - Connecticut, D. Wagner coll.
Caripeta piniata - New York, T. McCabe coll.
Besma endrapiaria - Connecticut, M. Volovski coll.
Besma quercivoraria - Connecticut, V. Giles coll.
Lambdina athasaria - Virginia, D. Wagner, M. Nelson, and M. Volovski colls.
Lambdina fiscellaria - Massachusetts, M. Volovski coll.
Lambdina pellucidaria - Massachusetts, M. Volovski coll.
Cingilia catenaria - Massachusetts, D. Simser coll.
Nepytia canasaria - New York, R. and D. Wagner colls.
Nepytia sp. nr. *pellucidaria* - New Jersey, D. Schweitzer coll.
Sicya macularia - Canada, no other data.
Euganabapta nivasaria - Canada, no other data.
Eutrapela clemataria - Connecticut, J. Joseph coll.
Patalene olyzanaria - New Jersey, D. Schweitzer coll.
Prachaeorodes lineata - Virginia, M. Volovski coll.
Tetracis cachexiata - New York, T. McCabe coll.
Tetracis cracallata - New York, R. and D. Wagner colls.
Antepione thisaaria - West Virginia, M. Volovski and D. Wagner colls.
Nematacampa resistaria - Connecticut, D. Wagner coll.

Dichorda iridaria - Connecticut, D. Wagner coll.
Synchlara aerata - Connecticut, D. Wagner coll.
Chlorochlamys chloraleucaria - Connecticut, D. Wagner coll.
Chloropteryx tepperaria - Alabama, T. McCabe coll.
Hethemia pistasciaria - Connecticut, D. Wagner coll.
Mesothea incertata - Connecticut, M. Volovski coll.

Cyclaphora pendulinaria - New York, R., V., and D. Wagner colls.
Scapula limboundata - Connecticut, V. Giles coll.

Anticlea vasiliata - Tennessee, D. Wagner and E. Hossler colls.
Xanthorhae ferrugata - Connecticut, K. Kubarek coll.
Hydrelia inarnata - New Hampshire, W. Kiel coll.
Venusia cambrica - Tennessee, D. Wagner and M. Thomas colls.
Venusia campitaria - Connecticut, D. Wagner coll.
Trichadezia albavittata - Tennessee, D. Wagner and M. Thomas colls.
Epirrita autumnata - Canada, P. Arcand coll.
Operaphtera bruceata - Connecticut, D. Wagner coll.
Eupithecia interruptafasciata - Connecticut, D. Wagner coll.
Eupithecia lariciata - Canada, no other data
Eupithecia miserulata - New Jersey, D. Wagner and E. Hossler colls.
Eupithecia palpata - Connecticut, D. Wagner coll.
Eupithecia ravocostaliata - Connecticut, S. Smedley coll.
Chloroclystis rectangularata - Connecticut, D. Wagner coll.
Cladara atroliturata - Connecticut, D. Wagner coll.
Cladara ?limitaria - Connecticut, D. Wagner coll.
Labaphara nivergerata - Connecticut, S. Smedley coll.

Subfamily Larentiinae (continued)

Heterophleps refusaria - Tennessee, D. Wagner and
M. Thomas colls.

Heterophleps triguttaria - Connecticut, M. Thomas and
D. Wagner colls.

Dyspteris abortivaria - Tennessee, D. Wagner and
E. Hossler colls.

Family Uraniidae

Calledapteryx dryopterata - Connecticut, D. Wagner
coll.

Callizzia amorata - New Hampshire, W. Kiel coll.

GLOSSARY

- abdomen:** that part of the body that includes the ten segments following the leg-bearing thoracic segments.
- abdominal:** of or pertaining to the abdomen.
- addorsal:** to either side of and parallel to the dorsal midline (see subdorsal and Figure 4).
- anal plate:** dorsal plate or shield on the last (10th) abdominal segment; often gumdrop-shaped or triangular (see Figure 2).
- anal proleg:** proleg arising from the last (10th) abdominal segment (see Figure 2).
- annulations:** shallow creases that run perpendicular to the body axis; especially evident over the dorsum of anterior abdominal segments.
- antenna:** elongate sensory structure just forward from the eyes (see Figure 3).
- anterior proleg:** proleg of the sixth abdominal segment (ventral proleg of others) (see Figure 2).
- aposematic:** having warning coloration; usually some combination of yellow, orange, or red, and offset with white, black, or other color that accentuates the markings.
- balloon:** to disperse (aerially) on silken threads. The first instar caterpillars of several geometrids disperse by ballooning. The behavior is prevalent among species with flightless females.
- band:** pattern running around the segments, perpendicular to the body axis.
- boreal:** of or pertaining to northern regions. Also relating to the boreal life zone, an ecoregion dominated by firs, spruce, larch, and other conifers.
- clypeus:** elongate plate between the antennae and immediately below the frons or frontal triangle (see Figure 3).
- cremaster:** the set of minute hooked setae at the terminus of the pupal abdomen. Many butterfly chrysalids hang upside down with the cremastral hooklets locked into a button of silk spun by the caterpillar.
- crochets:** hooklike structures on the abdominal prolegs (see Figures 5 and 6) used to engage the substrate or previously deposited strands of silk.
- crypsis:** concealment.
- cryptic:** blending into or resembling the background environment.
- cuticle:** the integument or skin of a caterpillar; in places it may be thin, pliable, and transparent, and in others it may be thickened, hardened, and opaque.
- dorsal:** along the back or upper side of the caterpillar.
- dorsum:** back or upper side of the caterpillar.
- family:** taxonomic ranking in Linnaean system below order and above the genus; all insect families end with the suffix *-idae*. The common name for a family may be formed by replacing the *-idae* with *-ids*.

- frass:** pelletlike excrement of caterpillars.
- frons:** triangular area in center of head, also called frontal triangle (see Figure 3).
- heart stripe:** middorsal stripe resulting from the visibility of the heart through the larval cuticle.
- hypoproct:** fleshy spur ventral to the anus; usually best developed in those species that rest on stems or twigs (see Figure 7 and paraproct).
- instar:** one of the larval stages; geometrids have four to seven instars, with five being most common.
- integument:** body surface, cuticle, or “skin.”
- intersegmental:** between adjacent segments.
- labrum:** upper lip, immediately below the clypeus; the flaplike plate that rests over the jaws; it is cleft or notched in geometers (see Figure 3).
- larva:** caterpillar; immature feeding stage of butterflies and moths and other insects with complete metamorphosis.
- lateral:** along the sides, in the vicinity of the spiracles.
- lobe (epicranial or parietal):** the rounded area of the head (vertex) above the eyes, to either side of the midline (see Figure 3).
- medial lobe:** fleshy protuberance that divides the crochets into two groups (see Figure 6).
- mesic:** of or relating to sites of moderate rainfall.
- middorsal:** along the dorsal midline of the body; see also heart stripe.
- midline:** (imaginary) line that delineates left and right sides of the body; that above the body is the dorsal midline and that below is the ventral midline.
- midventral:** along the ventral midline of the body.
- paraproct:** small, fleshy protuberance to either side of the anus; often held against substrate and best developed in those species that rest on stems and twigs (see Figure 7 and hypoproct).
- pinaculum (pinacula):** the hardened, usually round plate that bears a seta; in some genera the pinacula are blackened and rather shiny.
- polyphagous:** eating plants from two or more (usually taken to mean many) plant families (compare with specialist).
- prepupa (prepupae):** the non-feeding portion of the final larval instar; in geometroids the prepupa may rest within the cocoon or pupal cell for many months. The body is often shortened and the normal coloration lost; the prepupal period may be as short as a day or extend over as many as ten months (e.g., Spring Cankerworm).
- prolegs:** fleshy “legs” located on the abdomen that bear the crochets (see Figure 2).
- prothoracic shield:** dorsal plate atop the first thoracic segment; weakly developed in most geometroids.
- seta (setae):** hairlike or bristlelike outgrowth from the head or body.
- setal base:** hardened plate at base of a seta; pinaculum (pinacula).
- specialist (specialized):** feeding on one plant species, members of a single plant genus, or two closely related host genera from a single plant family (compare with polyphagous).
- spinneret:** the elongate silk-producing structure on the lower surface of the head.
- spinule:** minute spine.
- spinulose:** bearing numerous minute spines.
- spiracles:** oval to round lateral openings of the respiratory system found on the first thoracic and first eight abdominal segments.
- spiracular:** adjacent to or passing through the spiracles (see Figure 2).
- stripe:** marking that runs lengthwise along the body axis.

- subdorsal:** below the addorsal area (see Figure 4 and addorsal).
- subfamily:** taxonomic ranking within a family; animal subfamilies usually end with the suffix *-inae*. The common name for a subfamily may be formed by replacing the *-inae* with *-ines*.
- subspiracular:** below level of the spiracles and well above the prolegs (see Figure 4 and subventral).
- subventral:** more or less in line with the legs and prolegs, below subspiracular area (see Figure 4).
- superfamily:** taxonomic ranking above the family level; all moth superfamilies end with the suffix *-oidea*. The common name for a superfamily may be formed by replacing the *-oidea* with *-oids*.
- supraspiracular:** above level of the spiracles and below the subdorsal area (see Figure 4).
- thoracic:** of or pertaining to the thorax.
- thorax:** body area consisting of the three segments immediately behind the head that bear the true, claw-bearing legs.
- trachea (tracheae):** internal breathing tube of insects. Major tracheal trunks run between the spiracles along the sides of the body.
- transverse:** running across a body segment, perpendicular to body axis.
- triangle:** triangular area located between the eyes (Figure 3); elsewhere called the frontal triangle or frons.
- tribe:** taxonomic ranking between family and genus; animal tribes often end with the suffix *-ini*. The common name for a subfamily may be formed by replacing the *-ini* with *-ines* (the same suffix used for subfamilies).
- truncate:** appearing cut or squared off.
- venter:** underside or “belly.”
- vertex:** dorsal or top portion of the head (see Figure 3).

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